10 TIPS FOR FIRST FLIGHT SUCCESS p. 84

AUGUST 2005

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2005

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FLIGHT TESTS » Great Planes **Matt Chapman CAP 580**
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BY RICK BELL

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Special 2005 Buyers' Guide Section

ON THE COVER: the Matt Chapman 1/3-scale CAP 580 from Great Planes.
ON THIS PAGE: Audacity Models' Tiger 50 heli.

It's "Buyers' Guide" Time!

PARK AND BACKYARD FLYERS, SPORT PLANES, ENGINES, RADIOS, GIANT-SCALE aerobats, motors, hardware, gear ... you name it, you'll find it in our special "Buyers' Guide" section in this issue. With 86 pages of the latest planes and products—including a huge park-flyer section—the 2005 "Buyers' Guide" is a valuable resource you'll want to keep handy throughout the year. More than 600 listings are organized into product categories, so it's easy to find exactly what you need, and manufacturer and distributor information is included at the end of the guide. This special section starts on page 99.

When was the last time you cleaned your engine? At the field, dirt, dust, bits of grass and even water can all find their way onto—and into!—your powerplant. This month, engine expert Dave Gierke details easy ways to clean your engine at the field so you can make certain that this debris doesn't gunk up your engine. Dave also shares some at-home maintenance tips to remove varnish buildup (which can affect your engine's ability to cool down). Follow his simple steps, and you'll keep your engine running right.

Electric motor systems continue to offer more power and performance, and we have a special report on a plane that may be the biggest electric yet! This 46-percent-scale Hangar 9 Ultimate is powered by four Hacker motors harnessed by an Inner Demon gear drive and with four 6450mAh Li-poly packs. This powerful setup allows the Ultimate to hover at less than ½ throttle! Don't miss the inside story on page 70.

If you spend most of your time in the workshop cutting out and sanding ribs, you'll definitely appreciate Roy Day's quick and easy way to make perfect ribs every time. Whether you're building a straight or tapered wing, Roy's method is guaranteed to speed wing construction. And when you've completed your model, how about dressing up the cockpit a bit? "Scale Techniques" guest columnist Charlee Smith shares his advice on creating a beautifully detailed cockpit using ordinary household items. Check it out on page 204.

Our featured construction article this month, the Mini Ultimate Biplane, is another winner from designer Pat Tritle's workshop. With standard "stick-and-tissue" construction and a variety of suitable electric powerplants available, the Mini Ultimate is a fun, inexpensive build that will surely turn heads wherever it's flown.

Thank you to everyone who took the time to fill out last month's reader survey. We rely on your feedback to help us continue to provide the feature articles and reviews that you enjoy. We always welcome your letters and email: write to us at 100 East Ridge, Ridgefield, CT 06877-4606 USA, or email man@airage.com. We look forward to hearing from you.

Debra Cleghorn

Executive Editor

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Many thanks for the great flight tips, and please keep Quique's stuff coming!

FLYING WITH QUIQUE

I'm a student of 3D aerobatics, and I enjoy all of your flying-related articles. I've noticed that *Model Airplane News* is publishing aerobatic how-to articles by Quique Somenzini. The July issue featured his Harrier roll, and I'm happy to report that I finally get it! Thanks to those great illustrations and the breakdown of the maneuver into simple steps, I am now doing the Harrier roll the way it's supposed to be done. Many thanks for the great flight tips, and please keep Quique's stuff coming!

RANDY WATKINS, HUNTINGTON, WV

Randy, thanks for the encouragement. We love working with Quique; he's a great pilot who loves to share his techniques. The highly detailed flight illustrations are computer-generated by our buddy Marc D'Antonio of FX Models. The combination of a pro pilot and a pro illustrator is a match made in heaven! GY

PLANS SEARCH

I have been a modeler for more than 35 years and like to scratch-build. Over the years, I have compiled a fair collection of model-airplane plans—many of which I ordered from *Model Airplane News*. How can I decipher your plan numbers so I can look up the construction articles the plans were published with? Lately, when I have ordered plans from your service, small photocopies of the articles have been included, but I would much prefer to read the full-color articles from my magazine collection. Thanks for supplying the hobby with some great designs; they sure do beat the current crop of ARFs I see at the local flying patch!

MALCOLM EDWARDS SR., CHICAGO, IL

Malcolm, I am pleased that you enjoy our construction articles. Our plans library uses a simple 5-digit system to identify the issues the plans come from. For example: FSP 08861 represents the August 1986 issue, and FSP 03791

indicates the March 1979 issue. The last digit (usually, either a 1 or a 2) tells how many plans were in that issue. In recent years, the last digits have been replaced with alphabetic references: "A" for the first plans set offered in a given issue, "B" for the second plans set, etc. Hope this clears things up! **GY**

MODEL-BUILDING FOAM

I enjoyed Mark Rittinger's article on the B-26 Marauder in the December 2004 issue of *Model Airplane News*. The article mentioned "pink foam" insulation as a major building material. I looked in building supply stores but found only 4x8-foot by 2-inch sheets of white polystyrene. Is this the same material, or is the pink insulation different (and better) for modeling?

STEVE SMITH, SACRAMENTO, CA

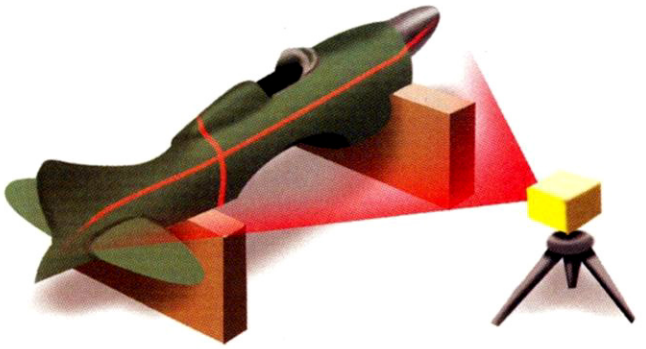
Steve, four types of foam are typically used in RC modeling: white foam (expanded polystyrene) is available in 1-, 1.5- and 2-pound densities; pink foam (Owens-Corning Foamular 150 or 250) is available in a 1.8-pounds-per-cubic-foot density; blue Dow foam comes in 1.8- and 2-pound densities. The fourth type is EPP foam (expanded polypropylene); this is commonly used for shipping. Pink and blue are ordinarily used in the U.S. as basement insulation. Perhaps you've had trouble finding them because many homes in California don't have basements!

Pink and blue foams are "closed-cell": millions of tiny air bubbles are trapped in them, and this makes them very easy to sand and shape. White is beaded, and it can be difficult to sand, but since it's available in your area, you can use it for wings instead of using pink or blue—if you can find it in the correct density. Thick wings can use 1-pound-density white; thinner wings benefit from the strength of 2-pound white, pink, or blue.

The foam fuselage on my Marauder is made of pink foam. Blue or 2-pound white would also work, but keep in mind that the white variety is a bit more difficult to sand and shape. I find pink and blue the best and easiest to work with when forming the fuselages and wings featured in my "Electric Warbirds" series of 42-inch-wingspan models. It provides a good balance of workability, cost, dent-resistance, strength and weight. Happy shopping! **Mark Rittinger**

WRITE TO US! WE WELCOME YOUR COMMENTS AND SUGGESTIONS. LETTERS SHOULD BE ADDRESSED TO "AIRWAVES," *MODEL AIRPLANE NEWS*, 100 EAST RIDGE, RIDGEFIELD, CT 06877-4606 USA; EMAIL MAN@AIRAGE.COM. LETTERS MAY BE EDITED FOR CLARITY AND BREVITY. WE REGRET THAT, OWING TO THE TREMENDOUS NUMBERS OF LETTERS WE RECEIVE, WE CANNOT RESPOND TO EVERY ONE.

Illustrations by Richard Thompson

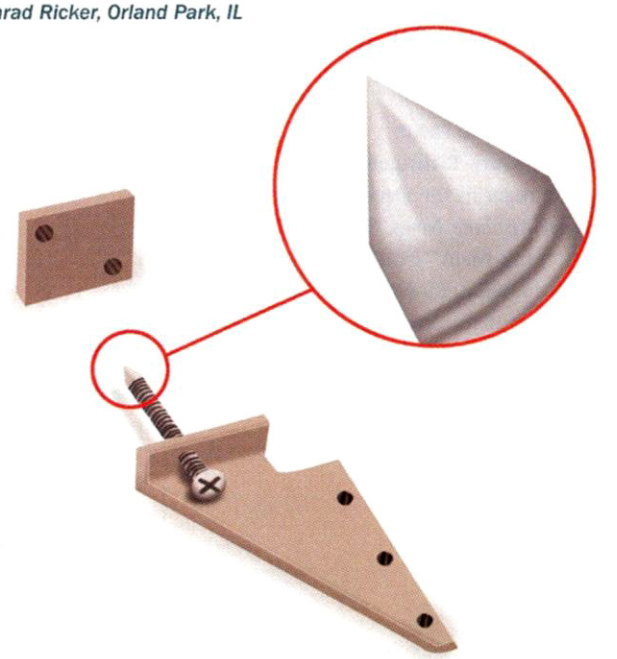


On the level

Looking for an easy way to lay out panel lines on a compound-curve fuselage? Try using one of the low-cost laser levels that are available at your local home-improvement center. The laser can be mounted on a tripod or blocked up; for vertical panel lines, it should be held at approximately 90 degrees to the fuselage's center line. When the laser is turned on, a line is projected around half of the fuselage side, and you can then easily mark it for masking the panel line. Turn the fuselage around to mark the other side. Use the same technique for laying out rivet and panel lines on wings or other irregular surfaces. Rotate the beam, and you can plot horizontal lines, too.
Ron Peterka, Ramona, CA

Self-centered

A typical way to secure control horns to elevators, ailerons, etc., is to insert a self-tapping screw through the horn and into a backing plate. As we all know, it can be very trying to get the screw started in the backing plate. A solution is to put a slight chamfer on the end of the screw so it will catch the hole and center itself.
Conrad Ricker, Orland Park, IL



Card tricks

Old business cards have 1,001 uses in the workshop. They're great for mixing epoxy on and as scratch paper for jotting down parts lists or measurements. They can also be used as shims when building or making small templates. Business cards also make excellent disposable squeegees for evenly spreading glue. Start collecting those cards, and see how many uses you can find for them.
Vince Warner, Stouffville, Ontario, Canada

Holding on

When transporting your models in a pickup truck or minivan, it isn't always easy to prevent them from rolling around. A simple way to solve this problem is to make several beanbags that are 12 to 15 inches long and about 3 inches wide. When placed across a model's landing gear, they'll hold the plane tightly to the car's floor and prevent it from rolling.
Gary Ritchie, Olympia, WA

SEND IN YOUR IDEAS. *Model Airplane News* will give a free, one-year subscription (or a one-year renewal, if you already subscribe) for each idea used in "Tips & Tricks." Send a rough sketch and a brief description to *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA. BE SURE THAT YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SUBMISSION. Because of the number of ideas we receive, we can neither acknowledge each one nor return unused material.

<Rumpler Taube 4C

Mike Hawkins
Bangkok, Thailand

With a wingspan of 80 inches, Mike's Taube is powered by an RCV 58 inverted engine and was scratch-built by following a simple drawing. Mike discovered that "The model flies well and slowly, as it should, but the washed-out ailerons are almost ineffective." To allow the use of the Taube's ailerons, he coupled them with the rudder for directional control. And check out the pilot figures! Mike included Kaiser Wilhelm II in the Taube's cockpit.

>Pronto Supreme

Ted Holdredge
Lakewood, CA

With a weight of 3.5 pounds and a 59-inch wingspan, this Pronto Supreme was quickly constructed after Ted read a construction article about it in the January 2005 issue of *Model Airplane News*. Because he has loved the model since the '70s, he made sure that he kept its original tail design. The Pronto has an O.S. .46 LA engine, an 11x6 prop and an Airtronics VG600 radio. Ted credits his wife for its eye-catching EconoKote color scheme.

<Hawker Typhoon, MK 1B

Henry J. Simon
Bobcaygeon, Ontario, Canada

Look at this beautiful building job! Featuring full flaps, landing lights, Unitracts Intl. retractable pneumatic landing gear, internal control horns and exhaust pipes that ventilate the cowl, this MK 1B rocks the runway. Henry spent a year perfecting his 13.6-pound, 73-inch-wingspan Typhoon. It's powered by an O.S. FS 1.20 Surpass III engine and a Futaba 6-channel radio, and it has 8 servos and a 3-blade, 15x8 prop from Graupner. The Perfect Paint color scheme is based on aircraft DN406, PR-F, which was flown by Sergeant "Pinkie" Stark in 1943.

>Playboy Senior

Jaromir Pipek
Milevsko, Czech Republic

This Playboy Senior comes to us all the way from across the Atlantic! Originally constructed in 1946, the antique flyer still has its original ignition system. It has awingspan of 88 inches, weighs 70.6 ounces and, according to Jaromir, is an excellent flyer. He powers his Playboy Senior with an Ohlsson .60 SP 10cc engine and uses a 600mAh battery pack and a Graupner transmitter, receiver and servos.

>Stuka-schmitt

Jerry Russell
Bend, OR

This 8½-pound scratch-built original is called the "Stuka-schmitt" because of its Stuka gull-wing and Messerschmitt forward fuselage. It features inverted, 72-inch gull wings, two O.S. .48 Surpass 4-strokes (one pulls and one pushes), fiberglass engine cowls and MonoKote covering. According to Jerry, it's "... smooth and stable in the air."

<Top Flite P-51

Jim Thurman
Nebraska City, NE

Jim decided to modify this P-51 kit by changing the cockpit, the engine thrust line and the outline to bring it "... closer to 'true' shape." Weighing 24.5 pounds, this ⅕-scale P-51 took almost four years to perfect. It's powered by a Moki 2.1 glow engine and covered with Flite-Metal over ¾-ounce cloth and fiberglass.

<Thunder Tiger Raptor 50

Bob Hocanson
Findlay, OH

Painted in attention-grabbing Cub Yellow, this Raptor has an O.S. .50SX engine, a Futaba 9C PCM radio, Futaba servos and a Futaba 401 gyro and governor. This heli allowed Bob his first attempt at 3D flying. At the time that Bob finished his model and told us about it, he was unable to fly it because of a recent snowfall. Please let us know how you made out, Bob, and be sure to keep us posted on your other projects.

>ASW glider and Piper Brave towplane

Joe Casey & Bill Carnes
Naples, FL

With Bill's Piper Brave pulling Joe's ASW glider, these two cause quite a stir at the flying field. Joe's ½-scale glider has a wingspan of 7.5 meters (24.61 feet!) and weighs 49 pounds. The model's fuselage is crafted of fiberglass, it has retractable landing gear, and its wings are made of obechi. It's controlled by a Futaba 9C radio system. But what's a glider without its towplane? Bill made the fuselage of his 82-pound Piper out of wood and fiberglass cloth. Its 14-foot wing is foam- and fiberglass-covered balsa. Bill's giant-scale Brave is powered by a Desert Aircraft 150cc twin engine; it also has two 1400mAh batteries, a Futaba radio and JR servos. The guys agree that despite the Brave's weight, "It is the most realistic flying model and lands like it weighs half its 82 pounds." Great job, guys!

SEND IN YOUR SNAPSHOTS. *Model Airplane News* is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable, but please do not send digital printouts or Polaroid prints. Emailed submissions must be at least 300dpi. We receive so many photographs that we are unable to return them. All photos used in this section will be eligible for a grand prize of $500, to be awarded at the end of the year. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in! Send those pictures to "Pilot Projects," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606 USA.

GREAT PLANES
GIANT U-CAN-DO 3D

If you're ready to step up to giant-scale 3D aerobatics, you'll love this latest model from Great Planes. This built-up ARF features a two-piece wing, MonoKote covering, painted-fiberglass wheel pants and cowl, engine mount, fuel tank, spinner, aluminum landing gear and a high-quality hardware package. Its large control surfaces and dual-servo aileron, elevator and flap controls ensure that the Giant U-Can-Do 3D offers all-out performance. Specs: wingspan—82 in.; wing area—1,772 sq. in.; weight—12.5 to 13.5 lb.; wing loading—16.1 to 17.4 oz./sq. ft.; length—84 in.; engine req'd—1.20 to 1.60 2- or 4-stroke or 2.0 to 2.5ci gas; radio req'd—4- to 8-channel w/8 digital servos. It costs $350.

Great Planes Model Distributors
(217) 398-6300; (800) 682-8948;
greatplanes.com.

HANGAR 9
EXTRA 260 ARF

Designed by aerobatics ace Mike McConville, this 27-percent-scale Extra 260 combines superior precision and 3D capabilities with the option of using a wide variety of engines, from potent, lightweight 50cc gassers to big-bore 4-strokes such as Saito's FA-180 and FA-220. The Extra's lightweight balsa-and-ply construction practically guarantees scintillating performance, and its durable carbon-fiber landing gear—much lighter than aluminum yet capable of handling rough, harrier-style landings—further maximizes strength while minimizing weight. It's covered in UltraCote and features a two-piece wing and stabilizer for easy transportation. Specs: wingspan—78 in.; length—72 in.; wing area—1,134 sq. in.; weight—11.5 to 15.5 lb.; engine req'd—1.20 to 2.20 2-stroke or 1.40 to 2.20 4-stroke, or 50cc gas. The Extra 260 costs $380.

Hangar 9; distributed by Horizon Hobby Inc.
(217) 352-1913; horizonhobby.com

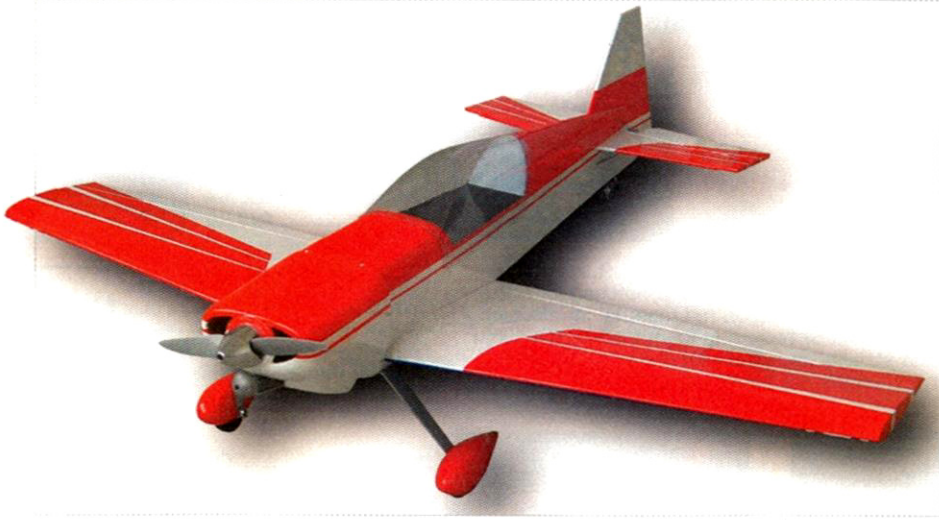
SPORT FLYERS
WILD FLY 3D

Love foamies? With the new, easy-to-assemble Wild Fly, you'll be out at the field in no time. It has interlocking parts and factory-applied colors, and even with the supplied 370 brushed motor, it offers great performance. Drop a brushless motor into its adjustable motor mount, and you'll see incredible hovering performance. Whether you're an experienced 3D pilot or just learning to hover, you'll appreciate the Wild Fly's precision and outstanding hovering capabilities.

Sport Flyers; distributed by Hobby People;
hobbypeople.net.

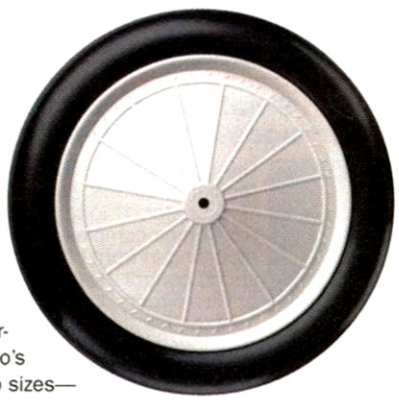
VMAR
F5E TIGER II

Jets aren't just for the rich and famous anymore: this .60- to .91-size ARF expands the RC flight possibilities for intermediate and expert RC pilots. It features laser-cut balsa-and-ply construction and comes with fixed main gear (it's also retract-ready!). You have to see its VCote 2 3DS covering in person to believe the amazing 3D details such as rivets and panel lines! The F5E Tiger II is available in traditional flat gray USAF graphics as well as in a more striking camouflage scheme and costs just $300. Specs: wingspan—56 in.; wing area—756 sq. in.; length—65.5 in.; weight—9.75 to 10.25 lb.; engine req'd—.60 to .91 2-stroke; radio req'd—4- to 6-channel w/6 to 8 servos.
VMAR; distributed by Richmond RC (877) 727-2329 or (604) 940-1066; richmondrc.com.



COX HOBBIES
GILES 202

The latest in the new Wings line of RC aircraft, this Giles 202 ARF features a fiberglass fuselage, cowl and wheel pants, laser-cut wood parts and standard-size hardware. It's also expertly covered in AeroKote! The Giles 202 offers plenty of performance for sport aerobatic pilots. Specs: length—47.8 in.; wingspan—49.6 in.; wing area—439 sq. in.; weight—5.5 lb.; engine req'd—.40 to .46; radio req'd—4-channel w/4 servos.
Cox Hobbies; coxhobbies.com.

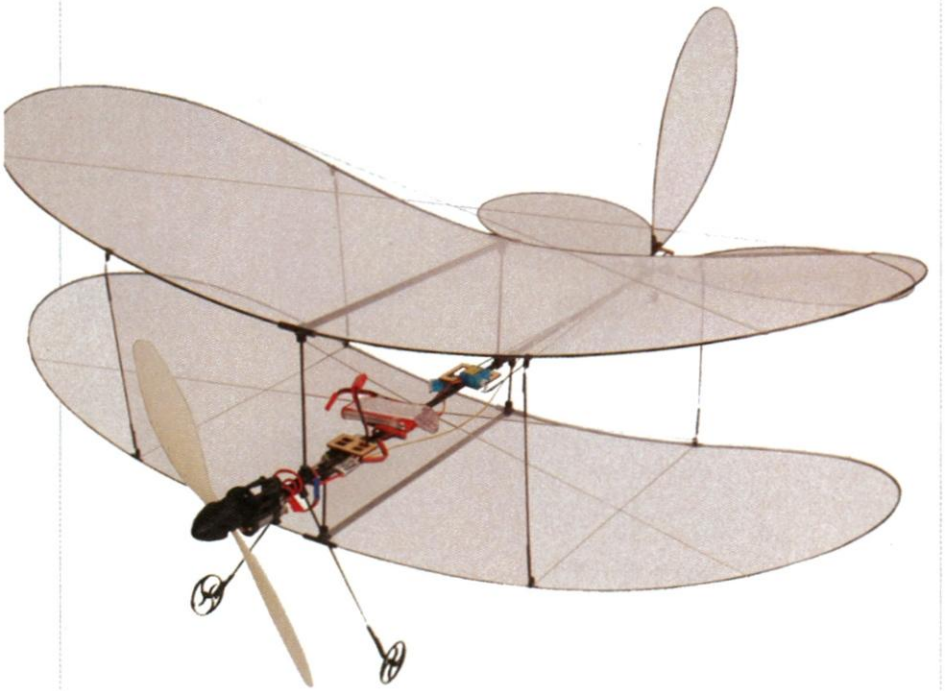


DU-BRO
VINTAGE WHEELS

Now you can build that vintage aircraft you've always wanted. Du-Bro's scale vintage wheels come in two sizes—¼ scale (7-inch diameter) and ⅕ scale (5.6-inch diameter)—and are made of lightweight, durable solid foam. The Vintage series was designed using actual WW I wheels and those of other early aircraft. Internally, the tire is secured to the ABS plastic hub, which can be painted. The axle diameter is 3/16 inch and can be drilled out to ¼ inch. Each wheel weighs approximately 7 ounces. A package of two ¼ -scale wheels costs $40; a package of ⅕-scale wheels is $38.
Du-Bro (800) 848-9411; dubro.com.

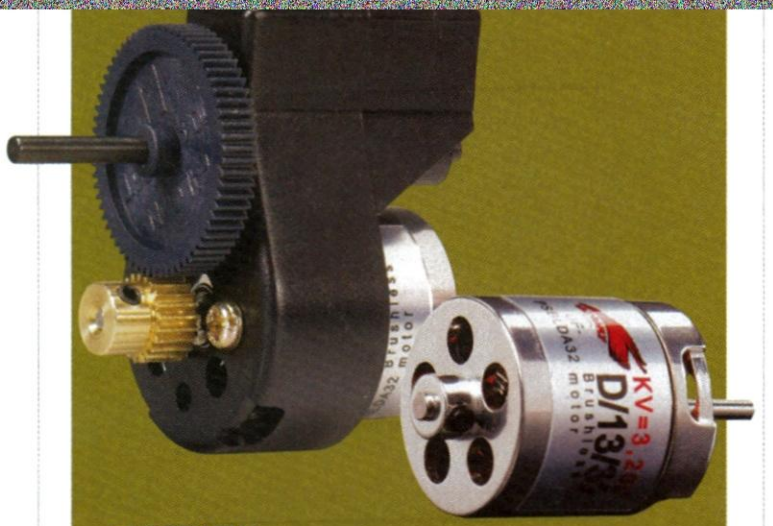
ICARE
PLETTENBERG ORBIT 30

One advantage of outrunner motors is that they provide plenty of torque without a gearbox. They're also incredibly efficient. Not content to rest on their laurels, the engineers at Plettenberg now offer their latest series of outrunner motors: the Orbit 30s. Ideal for powering aerobatic .40- to .60-size aircraft, these motors offer up to 1500 watts of output power! Each comes standard with an integral active cooling fan and can be mounted in the front or the back of your plane's firewall with an optional and very easy-to-install conversion kit. Orbit 30 motors are available in various winds for 12 to 30V applications and yield up to 86-percent efficiencies; this means smooth, cool running, even at very high power levels.
Icare (450) 449-9094; icare-rc.com.



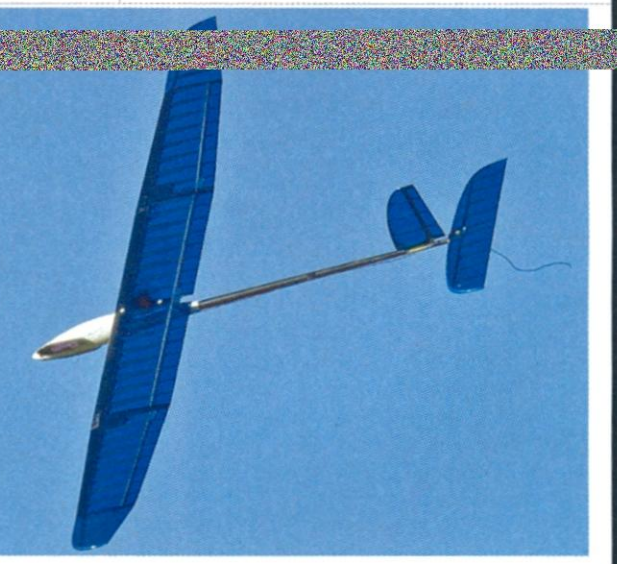
‹WATTAGE
SLOW JAZZ BIPE

This 3-channel indoor slow flyer features a factory-assembled, carbon-fiber frame with lightweight clear covering and comes with a motor, propeller and gearbox. It can easily fly in a 50x50x25-foot area, and you'll be pleasantly surprised by its responsiveness and maneuverability, even at walking speeds! It comes with lightweight hardware and uses standard micro radio equipment. Specs: wingspan—26 in.; wing area—485 sq. in.; length—31.5 in.; weight—5.5 to 6 oz.; wing loading—1.65 to 1.8 oz./sq. ft.
WattAge; distributed by Global Hobby Distributors (714) 963-0329; globalhobby.com.



^ULTRAFLY
NEW BRUSHLESS MOTORS

Designed for gear-drive applications, the brushless, sensorless D/13/32 motor is perfect for park flyers that weigh less than 2.2 pounds. The outrunner design is a direct fit into most motors. When used with the appropriate gear ratio, the D/13/32 can turn props from 6 to 11 inches in diameter. With a gearbox, the D/13/32 costs $80; without a gearbox, it's $70. Specs: shaft diameter—0.09 in.; shaft length—0.47 in.; motor diameter—0.925 in.; motor length—1.7 in.; max input power—160 watts; max rpm—40,000.
Ultrafly; distributed by Great Planes Model Distributors (217) 398-6300; (800) 682-8948; greatplanes.com.



^NORTHEAST SAILPLANE PRODUCTS
HYPER 1.8E

This electric sailplane is truly a technological breakthrough! It combines newer Drela-designed airfoils (shared by some of the best aerodynamicists in custom

It's a perfect vehicle for Speed 400 F5J competition. With its high aspect ratio, clean airframe and excellent airfoil choice, it offers a wide speed range. It's also easy to fly and offers maximum performance with very little tweaking. The Hyper 1.8E comes fully built and ready for radio installation, and you can outfit it with a Speed 400 for F5J contest flying or a 20mm Hacker brushless and 3-cell Li-poly pack for ultralight thermal soaring.
Northeast Sailplane Products (802) 655-7700; nesail.com. ✈

"Great Planes has REALLY DONE ITS HOMEWORK on this one!"

BY JOHN KOHLER > PHOTOS BY JOHN HOWELL, GERRY YARRISH & JOHN KOHLER

GREAT PLANES

MATT CHAPMAN CAP 580

A 1/3-SCALE ARF WITH WILD PERFORMANCE

OVER THE PAST DECADE, THE POPULARITY OF GIANT-SCALE aerobatic aircraft has enjoyed tremendous growth. Giant, almost-ready-to-fly kits have kept pace and evolved into some of the best quality and craftsmanship values around. Great Planes' new 1/3-scale Matt Chapman CAP 580 ARF is a prime example of this high-end value, and it shows that Great Planes really means business.

Matt Chapman recently gave his highly recognizable full-size CAP an extreme makeover by changing its white and blue paint scheme and switching to a more powerful engine to produce the CAP 580. This full-scale aircraft, which started as a Mudry CAP 231 EX, has a 24-foot wingspan, weighs 1,300 pounds and reaches speeds of 240mph. Its blistering roll rate is 400 degrees per second! It is a wild, one-of-a-kind airshow machine, and now Great Planes has the exclusive rights to the equally wild, giant-scale 1/3-scale CAP 580 ARF aerobat.

SPECIFICATIONS

MODEL: Matt Chapman CAP 580
TYPE: 1/3-scale aerobatic ARF
MANUFACTURER: Great Planes Model Mfg.
WINGSPAN: 99.5 in.
WING AREA: 1,885 sq. in.
WEIGHT: 30 lb.
WING LOADING: 36.8 oz./sq. ft.
LENGTH: 95 in.
RADIO REQ'D: 4-channel with 2 giant-scale high-torque servos for rudder, 6 standard high-torque servos for ailerons (4) and elevators (2) and 1 standard servo for throttle
ENGINE REQ'D: 4.2 to 7.2ci (80 to 120cc) gasoline
PRICE: $749.99

COMMENTS

The 1/3-scale Matt Chapman CAP 580 is a great-flying aerobatic giant that is very easy to assemble. The included hardware is excellent and perfectly matched to a model of this size.

HIGHLIGHTS

- Complete hardware package
- Easy to assemble
- Great flight characteristics
- Beautifully covered

BIG BOXES

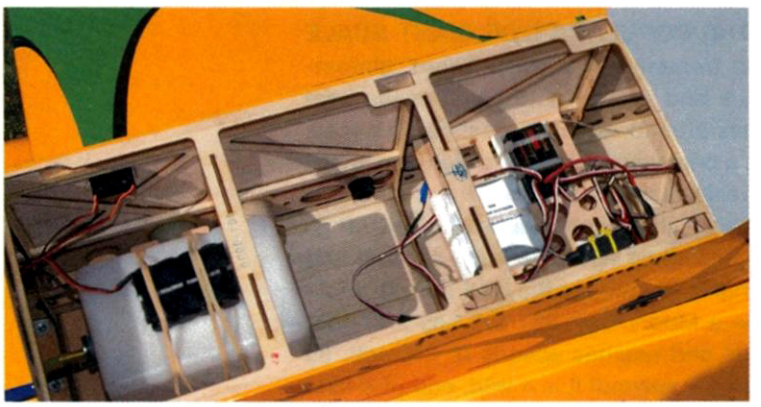
When I discovered two huge boxes on my front porch, I knew instantly that my 1/3-scale Chapman CAP had arrived! I opened them immediately to peek at all the components and goodies. All of the plane's major parts come well packed in Styrofoam and in individual plastic bags. The fuselage, wing panels and tail group are all built-up wood and covered in MonoKote. If you have trouble seeing this airplane, it's time to visit your eye doctor! Even the distinctive "paintball-splat" trim is done in MonoKote and sealed at the edges with a dab of clear paint. The fiberglass cowl and wheel pants are beautifully painted to match the covering.

The main hatch and canopy come completely assembled and are held in place with six bolts. The pilot figure and instrument panel are also included in the kit.

Also included are a set of painted landing gear, a painted-aluminum spinner, heavy-duty hardware, hinges, control horns, custom-made pushrods, gray stick-style hinges, gold-anodized, aluminum wing and stab tubes, universal metal servo arms and a pilot figure. If you already have the radio and the engine, there's almost no need to go to the hobby shop to finish this project. This is an extremely complete kit!

ASSEMBLY

I read the instruction manual from cover to cover so that I could plan my "attack."



With the hatch removed, you have totally unrestricted access to the onboard gear and fuel system.

A slick feature to help balance the CAP 580 is that the fuselage has two wing-attachment-tube positions. Depending on the weight of the engine you use, you can move the wing position 2 inches forward or aft.

Pilot extraordinaire Matt Chapman reveals the underside of his namesake Great Planes ⅓-scale CAP 580.

Flying the Great Planes CAP 580

MY SHORT FLIGHT WITH JOHN'S TEST model was very enjoyable. I was very pleased with the plane's ease of control. It gave me a good, confident feeling pretty much from the moment I took the transmitter. The roll axis is probably one of the best I have flown for this type of model, albeit a little less than precise, due most likely to the servo choice. The model's weight was just below 30 pounds; nevertheless, the plane has a nice, light feel to it. It slows down nicely, and the stall is straight ahead—controllable and predictable. Just relax the back stick a bit, and the plane is flying again. Rudder and aileron control are maintained throughout the stalls.

All of my pulls to vertical and the entries into loops were effortless. The plane tracks perfectly through the pull without any wing drop in either direction. On low rate, the rudder was plenty effective in the hammerhead turn. I didn't have an opportunity to land the plane, but I did notice that both the approach and touchdown speeds seemed very controllable—all at very slow approach speeds. The plane looked very happy doing 3-point landings.

I hadn't been a huge fan of the bull's-eye on the bottom of the plane—until today. Seeing the CAP 580 in the air sold me on the design! I had absolutely no problem with model orientation while flying this plane. It looked great in the air and really stood out in the pits.

I have my kit in the shop now. Today's flight has inspired me to dust off the box and get started on the plane.

—Matt Chapman

First, I used a soldering-iron tip to melt the covering away from the predrilled hinge holes. To ensure that the hinges will fit into place and move without binding, test-fit them before you glue them into place. The alignment of all the hinge holes was perfect, and after a couple of hours, all the hinges were in place. This is a good time to epoxy into place the two nylon wing-panel antirotation pins.

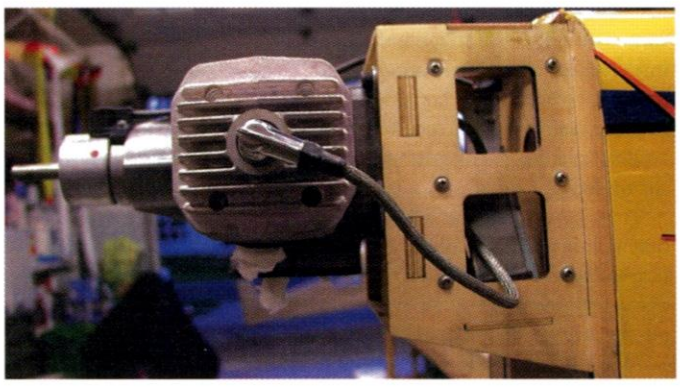
For the test model, I used Hobbico Command high-torque CS-70MG metal-gear servos; they do a good job of controlling the CAP. To power my Futaba 7CAP PCM 1024 receiver, I used one large, 7.4V, 5600mAh Li-ion battery pack with an MPI 5.4V voltage regulator.

Two servos are needed for each aileron, and one elevator servo is mounted directly in each stabilizer. Use large heat-shrink tubing to secure the connections for the Y-harnesses and the 6-inch extensions, so they won't pull apart. The model comes with strings installed in the servo bays to pull servo leads through the structures. Before you install the control horns, fit the servo arms onto the servos to ensure a proper 90-degree angle between the arms and the control-surface pushrods. The supplied control horns are heavy duty and very easy to install. Each horn consists of a black bolt that must be cut down to 2¼ inches. The other parts are made of black nylon, and they swivel to accommodate the proper angle needed to fit tightly against the control surface. The pushrods are factory-made and have one side that is reverse-threaded. This is a neat setup that simplifies fine adjustments of the pushrod length.

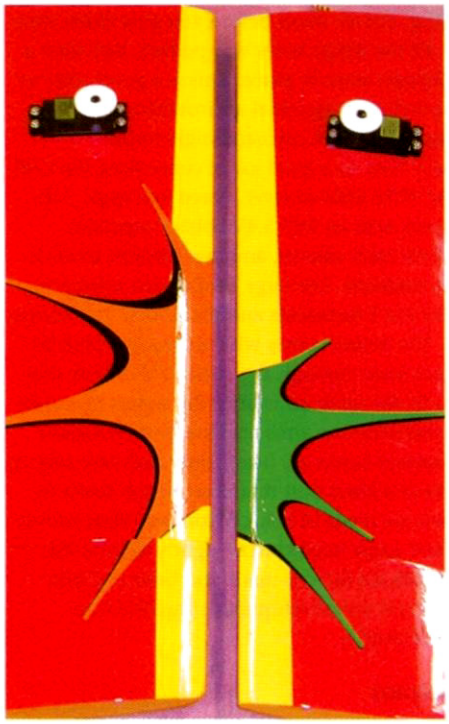
ENGINE MOUNT AND FUSELAGE

The recommended engine-size range is from 4.2 to 7.2ci. I chose a twin-cylinder 3W-100 engine that I've used for several years. I used a 2000mAh pack for the engine-ignition system. Any popular 100cc twin will work great for this aircraft. The firewall comes marked with the centerlines. If you use a DA100, the supplied aluminum spacers will provide the correct engine length from the firewall to the front of the cowl. My engine is longer, so the spacers weren't needed.

The engine is secured to the firewall with four supplied ¼-20 bolts and blindnuts. After you've test-fit the engine, remove it to drill the throttle-linkage and fuel-line holes. The plastic throttle pushrod is provided with the kit. The engine cowl is attached to the fuselage with three bolts and blindnuts on each side. The painted spinner does need to be cut out to accept your choice of propeller. I used a Mejzlik 28x10, and a little grinding was required for a perfect spinner fit. A standard throttle servo is needed and is easily installed in the plywood servo tray/receiver-mount plate. The 32-ounce fuel tank is simply attached with Velcro® to the plywood tank mount. The mount drops right into place, and you secure it with small wood screws.



The 3W-100 B2 twin-cylinder gas engine fits perfectly and provides ample power. The engine box structure has been lightened and has aluminum L-brackets for additional support.



The horizontal stabilizers plug into place and are supported by two carry-through tubes. The elevator servos are installed in the stabilizers, which makes it easy to break the model down for transportation.

RUDDER OPTIONS

You have a couple of options for the rudder servos. A hatch in the bottom rear of the fuselage has a preinstalled servo-tray cutout to accept two big Futaba S5050 servos. If you prefer standard high-torque servos, openings for those are also cut into the rear fuselage sides. I chose to go with the two Futaba S5050s under the concealed hatch. The kit includes metal servo arms and pushrods for hooking up the servos in tandem.

FINAL ASSEMBLY

Bolt on the axles, the wheel pants and the tailwheel assembly. This requires very little effort because all of the blindnuts were installed at the factory. The wheel pants come with plywood attachment plates installed and fiberglass reinforcement applied. Two cap-head bolts hold the pants in place, and four bolts secure each separate landing-gear leg to the gear mount. This is a strong setup!

The canopy comes attached to the top hatch, and all the blindnuts are in place. A fine instrument panel and a painted pilot figure are included and really give the cockpit a nice finished look.

Install the receiver, power switches and battery packs; then do the final radio setup. At this point, fewer than 20 hours of assembly fun have elapsed without a single frustrating moment! Install the receiver with a small piece of foam rubber underneath it, and hold it in place with two wire ties. Position the battery packs last, as placement depends on the balance requirements. The CAP 580 has two fiberglass wing-mounting tube sockets installed, so you can change the wing position forward or backward 2 inches to adjust the balance point. The wing panels are held in place with black nylon bolts screwed through the inside of the fuselage sides into the root ribs. The stabilizers are also removable; they slide onto two spar tubes and are secured with two screws. I put a small piece of clear tape over the screw heads to

PHOTO BY JON MARTIN

UP CLOSE WITH MATT CHAPMAN

A 20-YEAR VETERAN OF THE AIRSHOW WORLD, MATT CHAPMAN OF KENNETT SQUARE, PA, has gained the respect of the industry with crowd-thrilling maneuvers in his now-famous CAP 580 aerobatic machine. Matt's blend of precision flying (honed after years of world aerobatic competition) mixed with his unpredictable and wild airshow routines leaves spectators in a state of awe. When you watch Matt Chapman perform in his one-of-a-kind, paintball-splattered Lycoming CAP 580, no single word seems adequate to convey the excitement. The pilot, aircraft and presentation all blend together into a total adrenaline-filled package.

While performing his airshow routines, Matt pushes the CAP 580 to speeds in excess of 240mph and pulls up to 10G, all within a few feet of the ground. The aircraft's custom-modified Lycoming IO-580 engine spits out a gravity-defying 360hp and pushes both the man and the aircraft right to the limit.

When not in the aerobatic hot seat, Matt is a captain for American Airlines flying the MD-80 jetliner. He came up through the ranks as a flight instructor, charter pilot and corporate pilot before beginning his career with American. With more than 16,000 hours of flight time (3,000 in aerobatic aircraft), Matt brings unparalleled experience and from-the-heart love and commitment to aviation and the airshow industry.

Matt is also an experienced RC pilot who loves to fly giant-scale aerobatic and warbird models. He is also an established RC heli pilot. Whenever his schedule allows, he tries to attend big national RC meets such as the Joe Nall Fly-In and has been known to fly his impressive P-51 Mustang at the Warbirds over Delaware meet! Matt is now building a 35-percent-scale Pitts Model-12 from Bigairplanes.com.

Matt loves to share his experiences and passion with the public and loves to get to know his fans. At airshows, he encourages people to ask him questions and tell him about their own airshow experiences. Check Matt's website, mattchapman.com, for more information about his CAP 580 and his airshow travel schedule.

—Gerry Yarrish

click trip MODELAIRPLANENEWS.COM TO SEE THE FULL-SIZE CAP 580

IN THE AIR

I've known Matt Chapman for several years, so when I told him about this project, he kindly offered to fly up to New Jersey in his full-size CAP 580 and join us for the model's maiden flight. My club, the New Jersey Pine Barons, has a field directly across the street from a full-scale airport, so it was very easy to get the two CAP 580s together to compare notes. Matt is also a hardcore RC guy, and he was really excited to get his hands on the 1/3-scale 580 and help wring it out!

CONTROL THROWS

- **Elevator:** low rate, 1¼ in. up & down; expo 25%. High 3D rate, 3½ in. up & down; expo 50%.
- **Aileron:** low rate, 1¾ in. up & down; expo 20%. High rate, 2¾ in. up & down; expo 35%.
- **Rudder:** low rate, 4 in. left & right; expo 25%. High rate, 8 in. left & right; expo 45%.

GENERAL FLIGHT CHARACTERISTICS

After a thorough check of the engine idle and high end and a radio check with the 3W engine running, I taxied the model around to get a feel for it. It is very easy to steer and feels very solid; there's no nosing over at all. My co-pilot/spotter, Matt Chapman, checked the pattern, and I slowly advanced the throttle. The model climbed out with authority, and I had to come back to ½ throttle right away. Half throttle is more than enough power for most flying; full throttle should be used only for vertical maneuvers. Throttle management is very important.

- **Stability:** the airplane is rock-solid! In all axes, the CAP stays where you put it. It is a confidence-inspiring model.
- **Tracking:** the model tracks true and straight with very little rudder needed during extended vertical maneuvers. Ailerons rolls are very axial.
- **Aerobatics:** powered by the 3W-100, the model's vertical climbs are unlimited! There's enough power for any type of maneuver you wish to do, e.g.:

Knife-edge was the most pleasing move to do; it required very little rudder to maintain a straight line. My final trim compensation mixing was just 3 percent up-elevator slaved to the rudder. Roll coupling was not very evident, and I don't think any aileron compensation is required.

Loops require no rudder input, and again, the model's tracking is great.

Inverted flight requires just a touch of forward stick. (The model was balanced with the wing tube in the aft hole.) It just keeps flying straight.

Spins and snaps. The CAP does not drop a wingtip hard, so to enter a spin cleanly, you have to fully stall the wing with full up-elevator and then add full rudder. No aileron input is required. Snaps are very nice. Full left aileron, full elevator and full left rudder gave me a snap and a half the first time I tried, but it stops instantly; there's no over-rotation at all. This shows that the wings are built very light.

Stalls break straight ahead, and if entered from straight and level, the wing does not drop in either direction. To exit, just release a little backpressure, and the model is flying again! All controls remain effective.

The model's large control surfaces are very sensitive to control input, and this makes it ideal for 3D maneuvers. The model is quite capable of doing any IMAC aerobatic sequence.

PILOT DEBRIEFING

Landings can either be wheel or 3-pointers. The faster wheel landings are good for windy (crosswind) conditions. Three-pointers are "auto-pilot" easy! Hold onto the stick, and let it come in with a low idle and a moderate descent rate. When the model is about a foot off the runway, pull in a little elevator (a bit of backpressure) to hold the flare. The model just lands itself time after time—very pleasing! The Hobbico CS-70MGs are good servos for general sport flying, but if you intend to do aggressive 3D maneuvers or want to fly very precise aerobatics, I strongly recommend using more powerful Futaba digital servos that provide better centering performance.

This model is an ideal, true giant-scale, 3D-capable aircraft, and it's a great value when you consider the quality of the hardware included in the kit.

GEAR USED

ENGINE: 3W 100cc twin-cylinder gasoline

PROP: Mejzlik 28x10

RADIO: Futaba 7CAP PCM 1024

SERVOS: Hobbico Command high-torque CS-70MG metal-gear

prevent vibration from loosening them.

Once the CAP 580 was fully assembled, it was time to see what the balance point would be. With the wing tube in the front and giant servos in the tail, the model came out very tail-heavy. With the wing tube in the aft position, however, the CAP balanced right on the money!

The last step is to get out the iron and heat gun to remove any wrinkles in the covering. I did have to go over the plane a few times, but a little extra attention now will make the model look great in the sunshine. The kit includes two large sheets of graphics and the bull's-eye for the bottom of the fuselage. These really add to the model's scale appearance.

The CAP 580 is a pleasure to assemble and fly. Any modeler who has previously built an ARF of any size will find it a walk in the park to complete! Great Planes has really done its homework on this one. It flies as great as it looks, and I highly recommend it. ✈

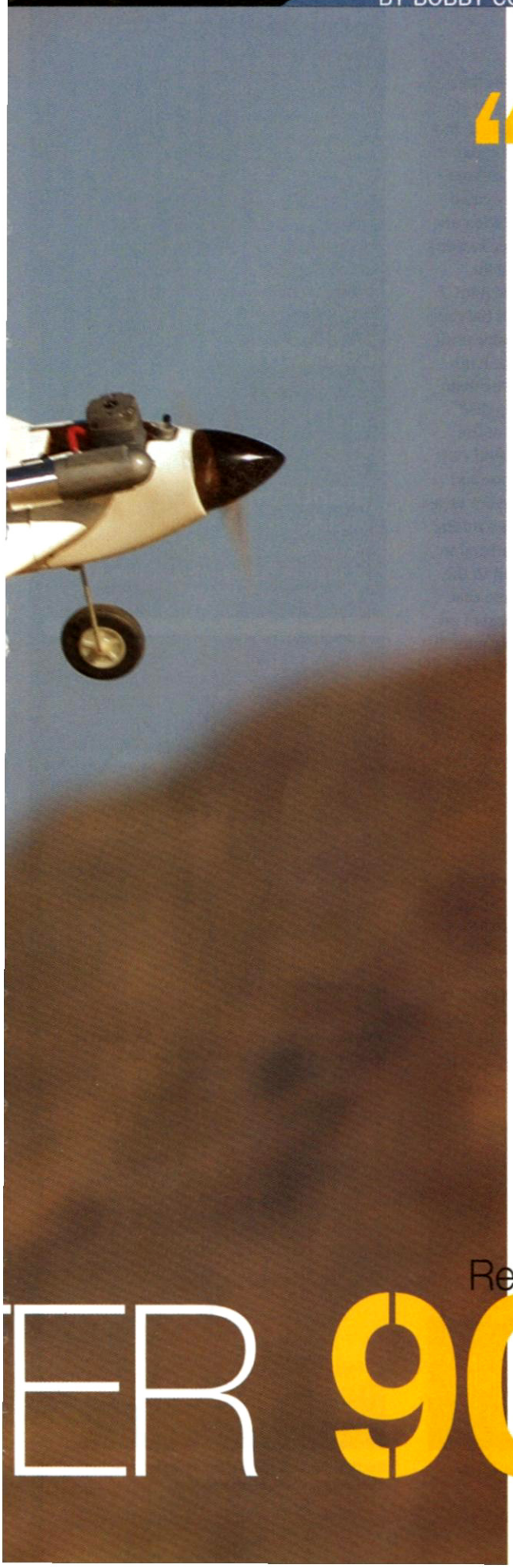
See the Source Guide on page 236 for manufacturers' contact information.

click trip MODELAIRPLANENEWS.COM FOR VIDEO OF THE 1/3-SCALE CAP 580 IN FLIGHT

MODEL TECH

DELTA FIGHT

BY BOBBY CORBETT > PHOTOS BY BOBBY CORBETT & JOHN REID



> "THE DELTA FIGHTER IS QUICK AND AGILE but easily manageable in flight."

THERE'S SOMETHING ABOUT A DELTA-WING AIRCRAFT that catches the eye. The mystique of a flying machine that doesn't have conventional tail feathers or a fuselage arouses our curiosity and defies our instincts concerning aerodynamics. The Model Tech Delta Fighter 90 ARF is the latest in Global Hobby's growing lineup of impressive models, and its quality will surprise you; it's built the way you would build it from a kit. Let's take a look at this unique model.

Redefining the rules for **flying wings**

TER 90 ARF

WHAT'S IN THE BOX?

The Fighter Delta 90 is not a small model! It has a wingspan of 54 inches and is a little more than 43 inches long. The model is easy to build and has very stable flight characteristics. The neat thing about the model is that it's based on Bruce Tharpe Engineering's Vortex and is endorsed by Bruce Tharpe himself.

All of the model's parts were neatly packed in plastic bags for easy identification. The wing panels (center section and outer tips), main landing gear, nose gear, elevon, throttle- and rudder-control system parts and the engine mount were in separate bags. Items that completed the kit included the wheels, a fiberglass cowl with a clear plastic template, hardware and a fuel tank. The model is constructed of laser-cut balsa and lite-ply parts and covered in Top Flite MonoKote. The wing panels were virtually wrinkle-free, and a couple of passes with a covering iron quickly smoothed out the covering. A very informative, 35-page instruction manual with photos clearly showed the assembly steps. The photos were very helpful to show the correct orientation of parts during the construction of the model.

To complete the Delta Fighter, you'll have to supply a .61 to .91 2-stroke engine, a 3-inch-diameter spinner, a computer radio that has elevon mixing and 2 high-torque and 4 standard servos, four 12-inch servo extensions and two Y-harnesses.

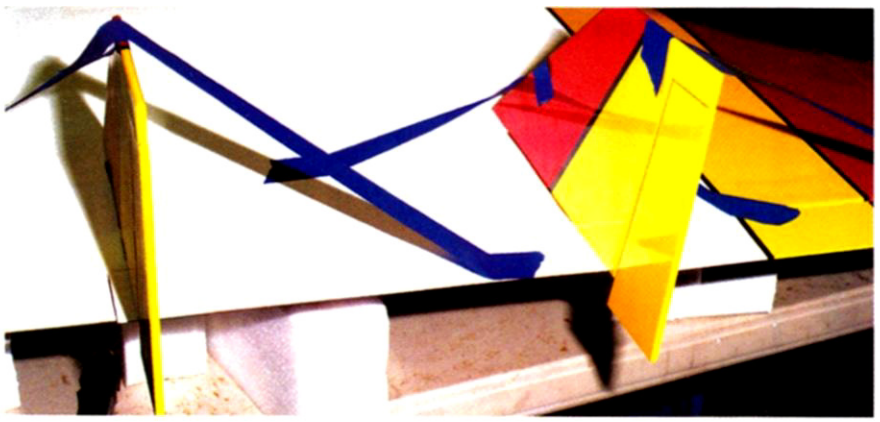
ASSEMBLY NOTES

Basic wing assembly Because there isn't a fuselage or tail feathers to deal with, the Delta Fighter goes together quite quickly. The first step is to remove the excess covering that overlaps the root ribs on the wing center section and outer panels. It's important that you get a solid glue joint here because this area is subject to the most stress; use only 30-minute epoxy. Now join the wingtip panels to the wing. When you are satisfied with the fit at both the leading and trailing edges, apply a thin layer of epoxy to both surfaces. I used masking tape to hold everything together until the epoxy cured.

Next, I added the trailing-edge center section; for easy alignment, it has three locating dowels that mate with the wing. Again, remove the covering for a solid glue joint. I hinged the elevons to the wing and the rudders to the fins, and I set the fins aside until later. After I cut the covering off the hardwood landing-gear blocks, I fitted the main gear and secured them with the supplied nylon straps and screws. The axles of the gear should be facing toward the middle of the wing. Next, I added the nose gear and hooked up the steering arm. The nylon nose-gear mounting block comes installed on the firewall, so I just had to add the pushrod to the steering arm and secure the unit to the mount block with a collar. Make sure that the retaining screw engages the flat spot on the nose gear. Working at a leisurely pace, I completed this part of the assembly in a few hours.

Engine The engine is installed upright, and the included engine mount is designed for a Magnum XLS .91 2-stroke engine; you just bolt it right in. The preinstalled blind nuts for the engine mount make this task simple. The engine's thrust washer has to be 5¼ inches from the firewall for the cowl to fit correctly.

I decided to jump ahead in the instructions and install the cowl. Model Tech includes a clear plastic cowl that serves as a template for marking the fiberglass cowl. It allows you to easily see where to make the necessary cutouts without spoiling the fiberglass cowl. Before you start, though, you'll have to supply a 3-inch-diameter spinner to



I used tape and a builder's triangle to make sure that the fins were perpendicular to the wing as the epoxy cured.

SPECIFICATIONS

MODEL: Delta Fighter 90 ARF
MANUFACTURER: Model Tech
DISTRIBUTOR: Global Hobby
TYPE: sport delta wing
WINGSPAN: 54⅜ in.
LENGTH: 43¼ in.
WING AREA: 1,287 sq. in.
WEIGHT: 7.5 lb.
WING LOADING: 13.43 oz./sq. ft.
ENGINE REQ'D: .60 to .91 2-stroke
RADIO REQ'D: 4-channel computer w/elevon mixing and 6 servos
PRICE: $199.99

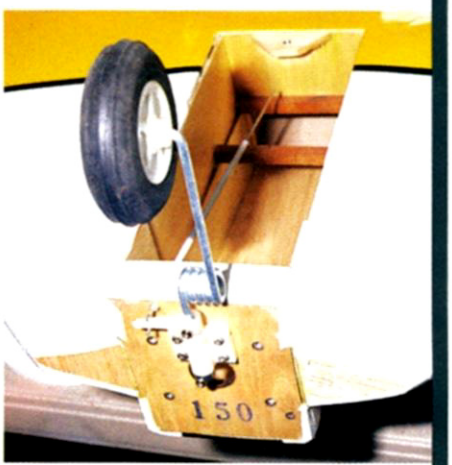
COMMENTS

If you are looking for a plane that's different and a blast to fly, the Model Tech Delta 90 is for you. I'm having too much fun flying it!

HIGHLIGHTS

- Quick and easy to build
- Excellent-quality kit
- Different colors top and bottom for easy orientation

The throttle and steering servos are installed in a recessed bay, along with the fuel tank.



Setting up the nose gear is easy; the nylon mounting bracket is preinstalled.


"The Delta Fighter DELIVERS ALL THE EXCITEMENT that a weekend flier could want."

IN THE AIR

The great Magnum XLS .91 engine is an excellent choice for the Delta Fighter 90, especially when combined with a Top Flite 14x6 prop and PowerMaster 10% fuel. The landing gear is a bit narrow, so when turning as you taxi, make slow and wide turns so the wingtips don't scrape the ground. The delta-wing design provides excellent lift and is very stable during nose-high landings.

CONTROL THROWS

Elevons: ±½ in.; 0% expo
Rudder: ± ½ in.; 0% expo

GENERAL FLIGHT CHARACTERISTICS

Stability: the tricycle landing gear makes ground handling excellent; the model requires very little steering correction to keep it tracking straight. Takeoffs are easy with minimal backpressure for rotation. Slow, nose-high landings are standard.

Tracking: handling is superb and solid; it stays put until instructed to do something else.

Aerobatics: the Delta Fighter does most basic aerobatic maneuvers such as snappy high-speed turns, rolls and loops. Rolls are straight and level, and the rate is awesome!

Glide performance: deadstick landings aren't difficult to control because of the generous wing area and minimal drag.

Stalls: because of its delta-wing design, the Delta Fighter can fly very slowly. The model is very hard to stall and offers no surprises.

PILOT DEBRIEFING

The kit's workmanship is excellent. It's covered in Top Flite MonoKote, so it's easy to repair. Don't fail to set the CG properly; I had to add 3 ounces of weight to the tail to get the model to balance. Use a radio that's capable of elevon mixing; the Futaba 7C that I used was perfect for the job.

The Delta Fighter delivers all the excitement that a weekend flier could want. With the recommended control throws, basic aerobatic maneuvers are fast and snappy. Wind penetration and vertical performance are excellent. The Magnum .91 provides blistering speed, yet the Delta Fighter is stable enough to land at a crawl. Because the delta design is so clean, throttle management is important so that you don't overstress the model.

properly align the cowl. First, fit the clear template over the engine, and align it with the spinner's backplate. Use a black marker to mark the cutout locations, and when you're satisfied with their positions, place the clear cowl over the fiberglass cowl, and transfer your marks. Now use a rotary tool to make the openings in the fiberglass cowl.

Now it's time to add the twin vertical-fin assemblies. I slid them into slots in the top of the wing; the fin's trailing edge must be even with the wing's trailing edge. When the fins are properly positioned, remove the covering from their base for a good glue joint, and use a 90-degree triangle to make sure that they are perpendicular to the top of the wing. After they have cured, flip the wing over and add the wing skids. They are basically extensions of the rudders and must be installed straight. Because the landing-gear stance is a little narrow, the skids also have a wire embedded in them to help prevent the model from tipping during ground maneuvers.

FINAL ASSEMBLY

Install the throttle and steering servos in the servo bay in the bottom of the wing. To access the bay, you have to cut the covering and remove the hatch. The servos are installed at the rear of the bay, and you need two, 12-inch servo extensions. The pushrods have to be bent a little to line up properly; just make sure that they don't bind or flex, and work the pushrods a few times to ensure that they operate correctly. I next plumbed and added the fuel-tank assembly to the front of the servo bay and also added some foam padding to absorb vibration. There's no need for a third fill line, as you can easily access the carburetor fuel line. I glued the canopy to the top of the wing with Pacer Formula 560 canopy glue, which quickly dries clear.

The remaining servos for the elevons and twin rudders are now installed. As recommended, I used two FMA Direct S360 high-torque servos (81 oz.-in.) for the elevons and two Futaba S3004 BB servos for the rudders in pockets in the underside of the wing. For proper elevon operation, you'll need a computer radio with elevon mixing. A Y-harness joins the rudder servos, and another Y-harness connects them to the steering servo that is then plugged into the receiver. You can use one servo to control the rudders; details are in the manual.

I installed the receiver and its battery in another bay behind the servo bay. This bay contains many wires and connections, so make everything as neat as possible. To keep the receiver antenna out of harm's way, it is inserted in a plastic tube that's built into the wing and runs to the wingtip.

Don't forget to properly set the center of gravity (CG); it's 21¼ inches in front of the trailing edge, measured at the centerline of the airplane. Balance the Delta upside-down with an empty fuel tank.

FINAL THOUGHTS

The Model Tech Delta Fighter 90 ARF is one of the best delta wings on the market. It's quick and agile but easily manageable in flight. Don't be surprised if you find yourself flying the Delta Fighter more often than any other model! ✈

See the Source Guide on page 236 for manufacturers' information.

GEAR USED

RADIO: Futaba 7C transmitter and R127DF receiver, 4 Futaba S3004 ball bearings and 2 FMA Direct S360 high-torque servos

ENGINE: Magnum XLS .91 2-stroke

FUEL: PowerMaster 10%

PROP: Top Flite Power Point 14x6

FLITON USA

QUIET ST

BY DAVE HARRIS > PHOTOS BY JOHN REID & DAVE HARRIS

F3A or park flyer—you decide!

QUIET STORM

WHETHER YOU'RE LOOKING FOR A HIGH-PERFORMANCE park flyer, an F3A trainer, or just a great-looking aircraft, the Fliton USA ARF Quiet Storm is for you. From its sleek body design to its five-color scheme, it immediately impresses. It's fast and fun to fly, and after a few dedicated hours, you'll have it in the air.

SPECIFICATIONS

MODEL: Quiet Storm
MANUFACTURER: Fliton USA
TYPE: pattern or F3A precision
LENGTH: 40 in.
WINGSPAN: 43.2 in.
WING AREA: 305 sq. in.
WEIGHT: 22 oz.
WING LOADING: 10.3 oz./sq. ft.
MOTOR REQ'D: brushless
RADIO REQ'D: 4-channel
PRICE: $149.95

COMMENTS

The Quiet Storm is perfect for intermediate pilots who are looking for an attractive, performance-oriented plane that's fast and stable yet takes very little time to build.

HIGHLIGHTS

- Beautifully covered
- Laser-cut parts
- Terrific aerobatic performance

THE KIT

The beautifully covered, laser-cut balsa and lite-ply construction are all the inspiration you'll need to start. The wing, fuselage and stab are covered in white, blue, yellow, pink and transparent Oracover film, and the formed, colored-plastic cowl and canopy require very little assembly. A sheet of custom decals allows you to trim the plane in any way that you want. The hardware package contains everything you'll need, and the well-detailed, 9-page, easy-to-read instructions have plenty of pictures for reference.

ASSEMBLY

I started by sorting out the parts and making sure that nothing was missing. A large work area is best for laying out completed sub-assemblies such as the wing and stabilizer, so I cleared my workbench. The Quiet Storm took me approximately four hours to make airworthy. The major steps are hinging and attaching the tail feathers, aligning the wing and installing the power system. The instructions guided me through two leisurely evenings of assembly.

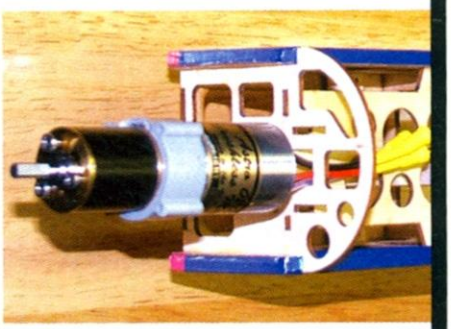
Fuselage The built-up fuselage is beautifully covered in many colors. Because most of the construction work is done at the factory, the fuselage requires only a little finishing to make it ready for the motor and radio. I carefully cut out the canopy and attached it to the upper fuselage hatch, which can be removed to allow access to the radio and battery gear. After that, I had only to trim the cowl to fit my motor. Because I was installing a motor, I had only to cut out a prop-shaft opening in the front of the cowl. All this took approximately 30 minutes.

Wing The Quiet Storm has a two-piece balsa and lite-ply NACA-airfoil wing; it's covered in brilliant, opaque red and solid white Oracover. The graphics have already been applied, and they look terrific. The wings slide on plywood joiners that extend from the side of the fuselage. Wooden dowels at the front and rear of the wing root prevent the wing from rotating and align the wing root perfectly with the wing cutout in the side of the fuselage. I checked the wing's fit and then permanently glued it to the fuselage with 5-minute epoxy.

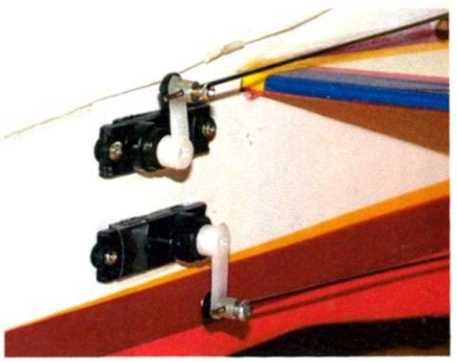
Stabilizer and fin I glued the elevator halves together to make the elevator. Then I attached them with CA hinges that I glued into the precut slots with thin CA. I attached the vertical fin and rudder to each other using the same method. Next, I inserted the stabilizer into the slot at the rear of the fuselage, checking to make sure that it was parallel to the wing; it was, so I glued it into place with thin CA. I attached the rudder in the same way; make sure that it's perpendicular to the stabilizer. This took only minutes to complete because the precut parts fit together accurately into the slots in the fuselage.

FINISHING

Fliton definitely went the extra mile with the Quiet Storm: so many time-consuming tasks have been completed for you. The final steps include installing the power system, the landing gear and the motor cowl, and these steps are nearly effortless; there's a choice of a 10mm stick mount or a custom, laser-cut motor mount for in-line gearbox mounting. The only power system that would require extra planning and work is an outrunner motor, but even that installation



Fliton simplifies matters by including a choice of motor mounts.



Externally mounted servos make installation and adjustment quick and easy.

The self-aligning wing makes installation effortless, and the plywood joiner keeps the wing straight.

IN THE AIR

During your first flight, give yourself time to get used to this plane's aggressive maneuvering capabilities, and take the time to trim it properly. If you use a computer radio (recommended), input lots of exponential for the ailerons and elevator to make the plane more docile.

CONTROL THROWS

Elevator: ± ¾ in (high); ± ½ (low); expo: 40%
Aileron: ± ½ in (high); ± ⅜ (low); expo: 70%
Rudder: ± ¾ in (high); ± ½ (low); expo: 40%

GENERAL FLIGHT CHARACTERISTICS

Stability: from takeoff to landing, I was comfortable with the Quiet Storm's flight characteristics. From hands-off to rolling circles, I always felt in control.

Tracking: at high speeds, this F3A precision aerobat tracks exactly where you send it. Even at medium to low speeds, it's a point-and-go aircraft.

Aerobatics: the Quiet Storm is a pristine aerobat that excels at almost all aerobatic maneuvers: snaps, knife-edge and fast, precise, point-on-point rolls; with the right pilot on the sticks, it will even hover and torque-roll.

Glide performance: because of its thin symmetrical wing, I didn't expect great low-speed-glide performance, but I was wrong. On landing approach, the glide is smooth and predictable, so landings are a breeze.

Stalls: like so many other planes made today, because of its low wing loading, stalls have to be induced. When I managed to induce it to stall, it was mild and easily recoverable.

PILOT DEBRIEFING

The Fliton Quiet Storm is a precision, high-speed, sport-oriented model. What I like best about it is its consistent, point-on-point accuracy. I recommend the Quiet Storm for intermediate and advanced pilots who want an inexpensive pattern plane to sharpen their flight skills and for anyone who simply wants a great-looking plane.

would not be difficult to figure out because most have several mounting options.

The landing gear takes very little time to complete because the attractive wheel pants are molded and ready to be installed. I drilled two holes in the wheel pants, fastened the wheels and pants to the gear and then mounted the gear in the fuselage using the supplied hardware. Finally, I attached the cowl to the fuselage with clear, multipurpose tape.

GEAR USED

RADIO: JR 9303, 4 GWS Pico servos

POWER SYSTEM: AstroFlight 020 w/4.4:1 planetary gearbox and a 25A AstroFlight ESC

PROP: APC 12x6 E

BATTERIES: Apogee 11.1V, 1570mAh Li-polys

RADIO INSTALLATION

Radio installation couldn't be easier: the transparent covering makes it a snap to guide the wires through the wings, and the externally mounted servos take only minutes to install. The removable canopy and plastic cowl allow easy access to the radio compartment, and that makes the installation a breeze. Using self-adhesive Velcro®, I installed the receiver, speed control and battery in the cockpit area in no time at all. Because the battery was the heaviest item in the flight pack, I positioned it where it would balance the plane.

Having installed the radio and correctly positioned everything, I used a Dremel Moto-Tool to cut air holes in the front of the fuselage to cool the electronics. I also cut an exhaust vent in the rear to release the heat. Please note that you must make the exhaust vent at least twice the size of the air intakes to ensure enough cooling airflow.

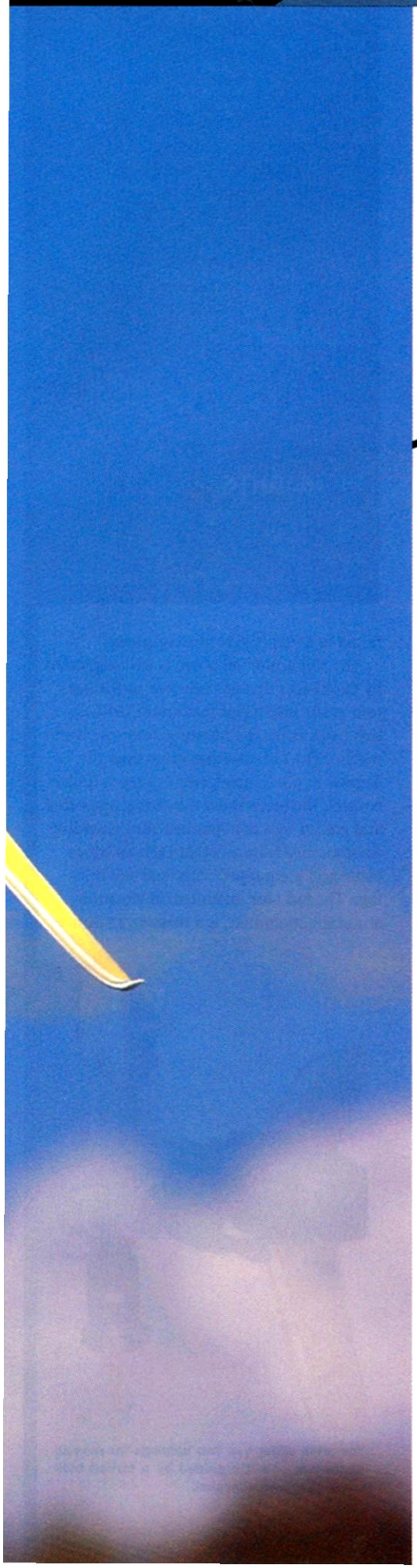
FINAL THOUGHTS

Fliton USA's Quiet Storm ARF has raised the bar for high-performance park flyers and F3A trainers. With its high-quality wooden construction, great looks and ease of assembly, it's a plane that any modeler would enjoy assembling. But it doesn't end there: its performance is outstanding, and it's a great trainer for aspiring pattern fliers. From its first flight, I knew that this plane would set the standard for all my future planes. ✦

See the Source Guide on page 236 for manufacturers' contact information.


TIGER

BY RICK BELL > PHOTOS BY PETE HALL & DERON NEBLETT



AUDACITY MODELS TIGER 50

Low cost—audacious performance!

IN THE HELICOPTER WORLD, the .50-class heli is one of the best values around, and when compared with a larger .60/.90 helicopter, the reasons quickly become obvious. This smaller heli is easy to afford and less expensive to repair, it's very stable, and its agility is excellent because it weighs less. In addition, most .50-class engines are almost as powerful as the .60s, and this gives them an outstanding power-to-weight ratio.

SPECIFICATIONS

MODEL: Tiger 50
MANUFACTURER: Audacity Models
DISTRIBUTOR: Genesis Hobby Distributors
MAIN ROTOR DIAMETER: 52.5 in. (1,335mm)
LENGTH: 42.5 in. (1,232mm)
WEIGHT: 7 lb. 5 oz.
RADIO REQ'D: 5-channel heli w/120-degree CCPM
PRICE: $285 kit; $299 ARF

COMMENTS

At last—a heli that's well suited to both beginners and experts. Low-cost and easy to build and set up, the Tiger 50 is the perfect heli for learning new tricks.

HIGHLIGHTS

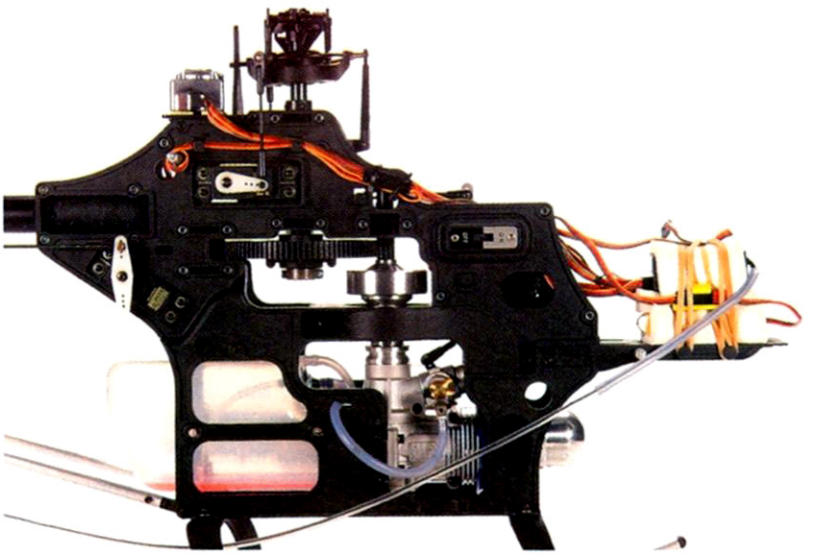
- Excellent manual
- Easy to build
- Low cost
- Outstanding flight characteristics

The latest heli in the .50-size market is the Tiger 50 manufactured by Audacity Models. This excellent, low-cost model is certain to give the "other guys" a run for their money. And don't be fooled by its price tag ($285 kit; $299 ARF); the Tiger 50 delivers heart-pounding 3D performance right out of the box by using the simplicity of 120-degree cyclic/collective pitch mixing (CCPM) and a reliable belt-driven tail rotor. As I found out, the Tiger 50 is a high-quality heli that's easy to build and fun to fly at a cost that's hard to beat. Read on to learn more.

KIT OVERVIEW

The Tiger 50 comes in two versions: as an almost-ready-to-fly (ARF) and as a kit (the subject of this review). To apply the term "kit" to the Tiger 50 is somewhat misleading because all of its major assemblies (with the exception of the engine/clutch, chassis and tail rotor) are factory-built; the pushrods have even been assembled to their correct lengths for a symmetrical 3D setup. This feature alone demonstrates that the Tiger 50 is a cut above the rest. And it doesn't stop there, as it has some features that are usually found only on high-end helicopters. The main rotor head is fully assembled and uses two radial bearings. It also includes thrust bearings for the demanding rigors of 3D flight. The seesaw carrier is fully ball-raced for smooth operation, and the kit includes a set of finished 600mm wooden blades. I know that a lot of experienced heli pilots prefer fiberglass or carbon blades and won't use the wooden ones, but they are a welcome inclusion for beginners. Also for beginners, the washout-mixing arms can be tuned to soften the control response.

The aluminum tail boom is well supported by two braces that are attached to the bottom of the chassis for maximum stiffness; this helps make the tail rotor responsive and precise. The tail rotor has more than 60 degrees of pitch range, and to keep it under control, the pitch slider is bearing-supported and guided by a dual-pin bellcrank assembly. Another nice feature is that each tail-rotor blade grip is equipped with dual ball bearings. The fuel tank, mounted on vibration-absorbing grommets, is a massive 14 ounces



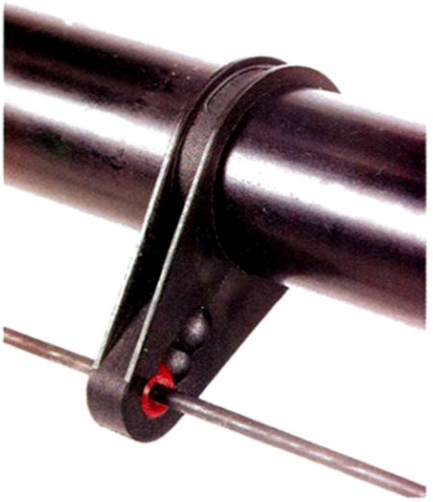
This right-side view of the chassis shows a neat and orderly layout. Note the clips for the servo leads.

The pitch slider has two bearings for reliable operation, and it's guided by a forked bellcrank that uses dual pins.

The sturdy rotor head is well designed for responsive and smooth operation.

for long flights, so you can really wring this wildcat out.

The 58-page instruction manual is a highlight that deserves special mention: it's very well illustrated and lists the items needed to complete the heli and the required assembly tools. Further, almost every assembly stage contains a "Pro tip." It also clearly explains the mechanical and electronic setups of 120-degree CCPM and how they interact with each other. To illustrate this, many graphs show examples of throttle and pitch curves for hovering and 3D aerobatics. If you've never used CCPM, this is an excellent guide. The manual also shows the precise position of the servo arms, where the balls need to be



Four guides support the tail-rotor pushrod along the length of the tail boom. Note the bead that the pushrod rides in and how the guide firmly captures it.

on the servo arms and the lengths of the pushrods. As you can see, Audacity Models has spent considerable time and energy to make the Tiger 50 setup as easy as possible.

ASSEMBLY

Chassis The Tiger 50 builds quickly, so I'll only highlight items and won't recite a blow-by-blow of "screw this part to that part."

Most of the assembly centers on the chassis, which is molded of a tough, reinforced plastic that will survive many crashes. The first items are the clutch bell and the tail drive; both are factory-assembled, so we're already ahead of the game! Attach the elevator link to the swashplate arm with a steel pin that's tapped into place. Make sure that the mold marks on the link face toward the rear of the heli, as the molded-in ball link is a one-way link. Fuel-tank assembly is straightforward; check the tank for any tiny scraps of plastic in it before you seal it.

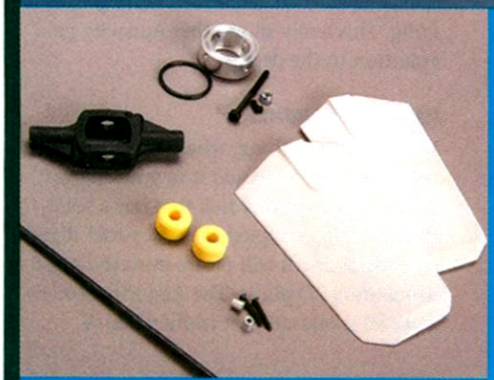
Instead of having to fiddle with separate nuts to secure the servos, one-piece servo-boss plates are used. They're simply pushed into place wherever a servo is mounted, and they make servo installation a snap. To assemble the chassis, add the subassemblies and screw the frames together. I really like that the frames are held together with socket-head bolts and locknuts instead of sheet-metal screws; no stripped mounting holes here! When you mate the frames, be sure to use the main shaft to perfectly align its bearings. Add the radio and gyro platform, the canopy mounts and the landing gear to complete the basic chassis build.

When you add the main shaft and the main gear, make sure that they're oriented correctly, and be sure to use the proper shoulder bolt on the gear. A groove is machined into the shaft for the mast stopper's setscrews. A lot of helis don't have this welcome little detail.

The most difficult assembly task was adding the cooling fan and clutch to the engine, as the fan hub uses a straight hole instead of a tapered collet and both must be dial-indicated for a smooth-running heli. When you add the engine to the chassis, insert the start shaft first, or you'll have to remove the engine to add it.

Main rotor and tail rotor The rotor head, swashplate and washout unit are factory-assembled, so all you need to do is add them to the heli. Then install and center the flybar and its paddles, and snap the pushrods into place. You have the option of installing lead weights in the paddles for a softer control response, and this is great for

FROM TAME CAT TO WILDCAT



IN STOCK FORM, THE TIGER 50 is a real pussycat that can satisfy pilots of different skill levels. To really unleash this cat, however, Audacity Models offers a range of inexpensive parts that increase the heli's prowess.

First is the 3D seesaw (flybar carrier). This part is included with the kit, and it features an extra set of holes that permit both the 1:1 and 0.7:1 Bell-Hiller mixing ratios (inner holes) to be used for 3D flight. Audacity also offers harder 3D dampers that allow stiffer damping, and that, in turn, permits more aggressive flight. To get more leverage from the swashplate, a set of 3D ball extensions is offered and takes only a couple of minutes to add to the swashplate. Top this off with a 3D flybar and paddles, and you'll have a heli that allows you a customized control response better suited to extreme 3D maneuvers. Just remember, though, that with increased control throw comes the possibility of binding, so be sure to check for any interference at the extremes of throw travel.

IN THE AIR

With everything checked and double-checked, it was time to get this cat airborne. All flying was done with the stock wooden blades, and we used Morgan 30% heli fuel. For hovering and sport aerobatics, we used the stock paddles with the lead weights installed, while the more advanced maneuvers were performed with the stock setup, and we then added the 3D parts for a direct comparison.

PITCH CURVES (IN DEGREES)

	Low stick	Mid stick	High stick
Normal	-3	+5	+10
Idle up 1	-5	+4	+10
Idle up 2	-10	0	+10
Throttle hold	-5	+5	+12

HOVER STABILITY

The first hover was a very pleasant surprise, as almost no trim changes were needed. The head speed at around 1,400 to 1,500rpm felt very good, and the blade tracking was perfect—not bad for factory-adjusted links.

In wind gusts, holding a steady hover was easy because the Tiger is very solid. The cyclic controls are well balanced, and the tail rotor has plenty of authority to hold the Tiger firmly in a strong crosswind.

SPORT AEROBATICS

The stock setup of head damping and weighted paddles provides a somewhat soft feel, but this helps the Tiger attain a stable hover and feel. Pushing the Tiger into forward flight showed that it tracks superbly.

Starting with some stall turns, the Tiger's vertical climb is impressive and seems to last quite long. Moving on to loops, the Tiger performs them at will and at any diameter you wish. Rolls were equally easy to do, but they do require a little fore/aft correction through the maneuver to make them axial. Mild 3D maneuvers such as flips and tumbles revealed that the Tiger handles them well, but it tends to slow down as it rotates through them; this was mainly due to the stock damping and weighted paddles.

3D AEROBATICS

I added Audacity's 3D upgrade parts and cranked up the head speed to around 1,700rpm. I would have liked to use a higher speed of 1,800 to 1,850rpm, but I didn't want to over-stress the stock wooden blades.

With the higher rotor speed, the Tiger still ran smoothly and was a lot more responsive. Punching the throttle, the model climbed aggressively without fanfare. The collective response was splendid, and as we put it through its paces, the cyclic response was tight and quick. Climbing to altitude, consecutive flips and tumbles were a lot more rapid, and it was easy to time cyclic inputs. Other maneuvers such as point rolls and flips were positive and sharp. It was easy to quickly master the Tiger.

I like to finish my flights with some autorotations, and the Tiger is easy-going in this flight mode. With the optional Limited Slip Drive installed, pirouetting and backward autos are possible. Be aware, though, that in calm conditions, the stock blades will run out of inertia and won't leave much room for error.

The Tiger 50 is an impressive model that's capable of a lot of performance. I'm having a ball with mine!

beginners. The ball links are designed to fit one way only and are supposed to have the letters "HD" molded on their fronts, but for some reason, the "HD" is missing. If you look closely at the link, however, you'll see a ring that's molded around the ball hole; this is the back side of the link that faces the servo arm.

GEAR USED

RADIO: JR 10X transmitter & JR 649 receiver, 3 JR 8231 digital servos (cyclic & collective), 1 JR 2700G servo (rudder), 1 JR 4001 servo (throttle), JR 500T ring gyro

ENGINE: O.S. .50SX-H Hyper

MUFFLER: K&S 50 Competition

FUEL: Morgan 30% heli

Assembling the tail rotor and tail boom is quick and easy; just follow the instructions. Be sure that you orient the drive belt correctly before it is tensioned, or the tail rotor will turn backward.

Radio installation and setup Like the rest of this heli's assembly, radio installation is painless. As you install the servos, you'll appreciate the servo bosses you installed earlier. Route the servo leads to the front of the heli, and make sure that they don't contact any moving parts. Molded-in clips on the right side of the chassis firmly hold the leads. When you install the tail-rotor pushrod, place a shallow Z-bend toward the front of it so it lines up with the servo arm. Also adjust the pushrod guides so the pushrod moves without binding.

Now build the servos arms, and place them on the servos. Space the balls 20mm from the center of the servo spline, but place the ball on the elevator servo arm at 23mm to prevent any interaction as the swashplate moves up and down. As mentioned, the pushrods come assembled, and they are right on the money. Install your receiver, gyro and battery, and the heli is complete, except for the canopy.

If you have followed the directions, when you turn on the radio system for the first time, the linkages will be almost perfect; mine were. To achieve a basic setup, I didn't need to do very much radio programming. This really shows that Audacity paid attention to the details.

PARTING THOUGHTS

You cannot go wrong, whether you start out with the Tiger 50 or add it to your hangar. This is a high-quality heli that has a solid chassis design coupled with excellent flight characteristics. It will please even the most demanding 3D pilots. The Audacity Models Tiger 50 is one cat that really roars!

See the Source Guide on page 236 for manufacturers' contact information.

> **"The Groovy 50 3D's low cost and great versatility make it a great model for the WEEKEND WARRIOR."**

BY CRAIG TRACHTEN > PHOTOS BY DERON NEBLETT

THE WORLD MODELS GROOVY 50 3D

A SMALL PLANE WITH BIG **3D PERFORMANCE**

***GROOVY*; NOW THERE'S A WORD THAT I HADN'T HEARD IN YEARS.** When associate editor Rick Bell asked whether I would like to review this model—sight unseen—I said yes, for two reasons: its name intrigued me, and it's from The World Models. After I had built the kit and flown the plane, Rick and I began bantering about how many '60s phrases we could come up with to describe this model. We stopped when we got to, "My Groovy is out of sight, man!" All kidding aside, this is an aircraft that builds fast and is fun to fly.

SPECIFICATIONS

MODEL: Groovy 50 3D
MANUFACTURER: The World Models
TYPE: sport/3D ARF
WINGSPAN: 54.5 in.
WING AREA: 648 sq. in.
LENGTH: 53.5 in.
WEIGHT: 5 lb. 3 oz.
WING LOADING: 18.44 oz./sq. ft.
RADIO REQ'D: 4-channel w/5 servos
ENGINE REQ'D: .46 to .70 2- or 4-stroke
PRICE: $139.99

COMMENTS

Constructed of balsa and ply and covered in an attractive, multicolored trim scheme, the Groovy 50 3D is capable of flying pattern and 3D maneuvers. Its low cost and great versatility make it a great model for the weekend warrior.

HIGHLIGHTS

- Well constructed
- Top-quality hardware
- Beautifully painted fiberglass cowl

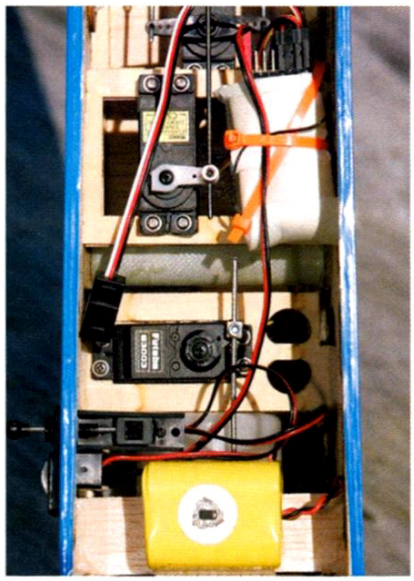
The O.S. .46AX and Slimline Pitts muffler make for a clean installation.

The wing panels slide onto an aluminum tube and are held in place by screws.

IN THE BOX

As soon as the box is opened, you know you have a winner just by the way the kit is packed. Each component is individually wrapped to protect the beautifully covered airframe. The wings and fuselage are built of balsa and lite-ply, and the wing is fully sheeted. All hardware is bagged by assembly step, so you won't have all the hardware you don't yet need all over your workbench. The painted, multicolored fiberglass cowl is not only wrapped in plastic, but it's also protected by a clear, molded-plastic cover that is later used as a template to make the cutouts in the cowl. Everything you need to complete the airframe—including a painted pilot—comes in the box.

You'll need five servos to control the Groovy, as the ailerons are activated by separate servos. I really liked the included rudder pull-pull cable system, and the elevators use two pushrods that are joined at the servo for easy installation.



The radio installation is neat and tidy.

ASSEMBLY NOTES

Wing The wing panels plug into the fuselage with a hefty aluminum tube, so you don't need to join them. Two screws that are threaded into the aluminum tube firmly hold the panels in place during flight. Start by cutting open the servo bays in each wing half. You'll need to attach a servo-lead extension to each servo; I used 14-inch Futaba extensions. The wing panels have a pull-string to help you snake the servo leads through them. I hinged the ailerons to the wing with the included CA hinges and inserted a T-pin into the center of each hinge; this ensures that all the hinges are equally spaced between the two surfaces. I used a bottle of Bob Smith Industries flexible CA fitted with a fine tip to apply the glue to the hinges; this gets the job done quickly and cleanly.

Attaching the control horns to the ailerons is a no-brainer because The World Models has drilled pilot holes. You just have to open them to the correct diameter (2mm). When you build the aileron linkages, make sure that you tape or clamp the ailerons in a neutral position and electronically center the servos. Then measure the linkages' length and install them. Don't forget to add the safety rings to the clevises. This completes the wing.

Empennage After removing the covering from the horizontal stab where it contacts the

THE GROOVY 50 3A GOES ELECTRIC

THE GROOVY 50 COMES IN TWO VERSIONS: the Groovy 50 3A and Groovy 50 3D. These models are very similar but play different roles. The 3A is more for pattern-type maneuvers and the 3D is more for—well—3D. The differences lie mostly in the wing: the leading edge of the 3A's wing has a lot of taper in it with a thinner airfoil and slightly less area than the 3D's wing for better wind penetration.

Since we had both models, I thought that it would be fun to convert the 3A to electric power. The 3A's design and light airframe (2.75 pounds empty) make it good for this project. Another key feature is that the top hatch on the forward fuselage is removable; no modifications are necessary for quick and easy battery access. With the accommodating servo layout in the fuselage, the battery can be placed with little effort where the fuel tank normally resides. The wide nose of the Groovy also allows easy motor mounting, and the cowl neatly covers the installation.

I built the Groovy 3A per the instructions, and all went very well. To power my modified Groovy, I used an Axi 4120/14 brushless outrunner motor, a Jeti Advance 70A Opto speed control and a Kool Flight Ultimate BEC that eliminated the need for an onboard receiver battery. I used a Kokam 4S2P (14.8 volts), 6000mAh Li-poly battery to make it all go.

A Southgate Aero custom motor mount made mounting the motor a piece of cake. I needed only to pop out the factory-installed blind nuts and reposition them for the new mount. This mount costs approximately $30 and can be made to the exact firewall-to-prop length needed. Spacer and hardware kits are available for other custom installations.

The biggest modifications I needed to make were adding cooling holes and slightly enlarging some of the fuselage formers to accept the battery. I secured the battery with strips of Velcro® that I glued to the bottom of the fuselage. The final weight of the model came out to be 5.5 pounds.

STATIC TESTS

With the Kokam battery fully charged by my AstroFlight Digital 109 lithium charger, I used a tachometer and an AstroFlight Whattmeter to perform the static tests.

At full throttle, the power system produced 810 watts of power while drawing 60 amps. The APC 14x10 electric prop turned at 8,600rpm. These numbers told me that a minimum of 144 watts per pound of power would be on tap. This should be plenty of juice for sparkling performance.

FLIGHT PERFORMANCE

Well, I certainly wasn't disappointed! My modified Groovy 50 3A gets airborne in a hurry from a grassy runway. When it flies, it's immediately obvious that this model lacks nothing in the area of vertical performance.

This Groovy 50 has a solid feel in flight, and basic aerobatics such as loops, rolls, Cuban-8s, spins and stall turns are a snap. Any pilot will quickly be at ease with the electric Groovy's flight characteristics. It can also stylishly perform more advanced pattern maneuvers such as Humpty Bumps, the Shark Tooth and inside and outside snap rolls. All in all, I'm very happy with the electric-powered Groovy 50 3A.

—Rick Bell

fuselage, I test-fit it and found that I didn't need to make any adjustments. I epoxied the stab into place after making sure that it was square and perpendicular to the wing. Because the fuselage bottom is flat, I put some weight inside its nose and placed a block under each tip of the stab. A quick check with a steel ruler reassured me that the stab was centered from side to side. After the epoxy has cured, hinge the elevators and the rudder as you hinged the ailerons by using T-pins and thin CA. The vertical fin is an integral part of the fuselage, so that assembly step is eliminated. Now install the tailwheel assembly and attach the elevator and rudder control horns where shown. Again, the pilot holes are predrilled.

Fuselage assembly There isn't a lot to do here. The heavy-duty, aluminum landing gear is attached to the bottom of the fuselage with six screws, and the blind nuts are factory installed. It will be pretty tough to bend this gear! The wheels supplied with the kit are too small to use when taking off from a thick-grass runway, so I replaced them with Du-Bro's 3¼-diameter Lite wheels (item no. Dub325TL); these worked very well. I also left off the fiberglass wheel pants because the larger wheels would not fit into them.

I attached the engine mount to the firewall and mounted the engine; again, the blind nuts are already installed. To power the Groovy, I installed the new O.S. .46AX horizontally. Because I wanted to preserve the lines of the beautifully painted cowl and not cut away a portion of it to accommodate the engine's muffler, I used Slimline's compact Pitts muffler (item no. SLI3218); it fits nicely inside the cowl, and the exhaust exits from the cowl's underside.

Radio installation Now install your servos. I used Hobbico Command CS-60s and placed the FMA Fortress receiver next to the elevator servo. I also used a Futaba 4-cell, 1500mAh receiver battery that I moved around until I achieved the correct center of gravity (CG). Note that the construction photos in the manual show the rudder and elevator servos reversed. Also, be sure to install the throttle servo so the pushrod has the straightest possible shot to the carburetor. My throttle pushrod was almost a straight run, but to clear the Pitts muffler (it can sit closer to the engine than the stock muffler), I had to make a shallow Z-bend.

The rudder uses a pull-pull cable system. Just follow the instructions for its installation and be sure to check the rigging linkage at the servo. I had to bend the coupler a bit

IN THE AIR

The Groovy 50 3D was one airplane that I couldn't wait to fly. I broke in the O.S. .46 AX engine on the bench using HobbyTown 15% 2- and 4-cycle fuel. I've used this fuel for a while now with excellent results.

CONTROL THROWS

Aileron: ± ¾ in. (low), 15% expo; 1¾ in. (high), 30% expo
Elevator: ± ¾ in. (low), 20% expo; 1½ in. (high), 35% expo
Rudder: ± 1½ in. (low), 15% expo; 2½ in. (high), 25% expo

GENERAL FLIGHT CHARACTERISTICS

Stability: the Groovy 50 is very stable; at just above idle, the model floats around easily.

Tracking: the model tracks very well at high and low speeds, and no trim changes were noted between them.

Aerobatics: if you can think of it, the Groovy 50 can do it. Control response is good without being twitchy.

Glide performance: the Groovy is a good floater; it glides well and takes a while to settle for a landing.

Stalls: the plane won't stall if you keep a few clicks of power and use low rates.

PILOT DEBRIEFING

The Groovy 50 performs loops, rolls, figure-8s and knife-edge flight very well, but this is a 3D plane, so why bother with pattern-type maneuvers? On 3D control rates, the Groovy's nose will stay at 45 degrees with very little roll or pitch coupling. Full rudder deflection allows the Groovy to perform knife-edge loops—very impressive! I did find that using a spoileron mix helped prevent the wing from rocking during harrier maneuvers. Entering a harrier with the Groovy is easy: fly to a stall, and slowly apply up-elevator as you adjust the throttle for a nose-high attitude.

The combination of the O.S. .46AX and the APC 12.25x3.75 propeller is excellent for this aircraft, even though a little more power would make it easier to pull out of a hover. Nonetheless, this combo gives you the equipment you need to increase your 3D skills!

to line up with the cable. If they aren't aligned, stress will be placed on the output shaft of the servo, and that can cause premature wear. A neat clamp is supplied to make it easy to install the Y-type elevator pushrod. Just make an L-bend in the three pushrods, place them in their respective holes in the clamp, and then screw the cover plate into place. I found it easier to insert the two, long, wire pushrods through the fuselage from the tail into the radio compartment and then make the L-bend, instead of the other way around.

Mounting the engine sideways made installing and fitting the cowl one of the easiest modeling tasks I have encountered in a long time. The clear-plastic template cowl really helps here. I removed the engine head and slipped the clear cowl into place. It was then very easy to locate, mark and cut the various required openings. I then slipped the clear cowl over the fiberglass cowl and made the necessary openings.

GEAR USED

RADIO: Futaba 9C transmitter, FMA Fortress receiver and 4 Hobbico Command CS-60 servos

ENGINE: O.S. .46AX 2-stroke

FUEL: HobbyTown 15% 2- and 4-cycle

PROP: APC 12.25x3.75

FINAL THOUGHTS

The World Models Groovy 50 3D is an extremely easy airplane to assemble. All of the parts fit very well, and the hardware is of excellent quality. The ease of building means that you will get to enjoy the flying that much sooner; it can be ready to fly in just 6 to 8 hours. But none of this really means anything if the airplane doesn't fly well, which I'm happy to say is not the case with the Groovy 50 3D. To put a slight twist on an old commercial tag line: "Fly it. You'll like it!"

See the Source Guide on page 236 for manufacturers' contact information.

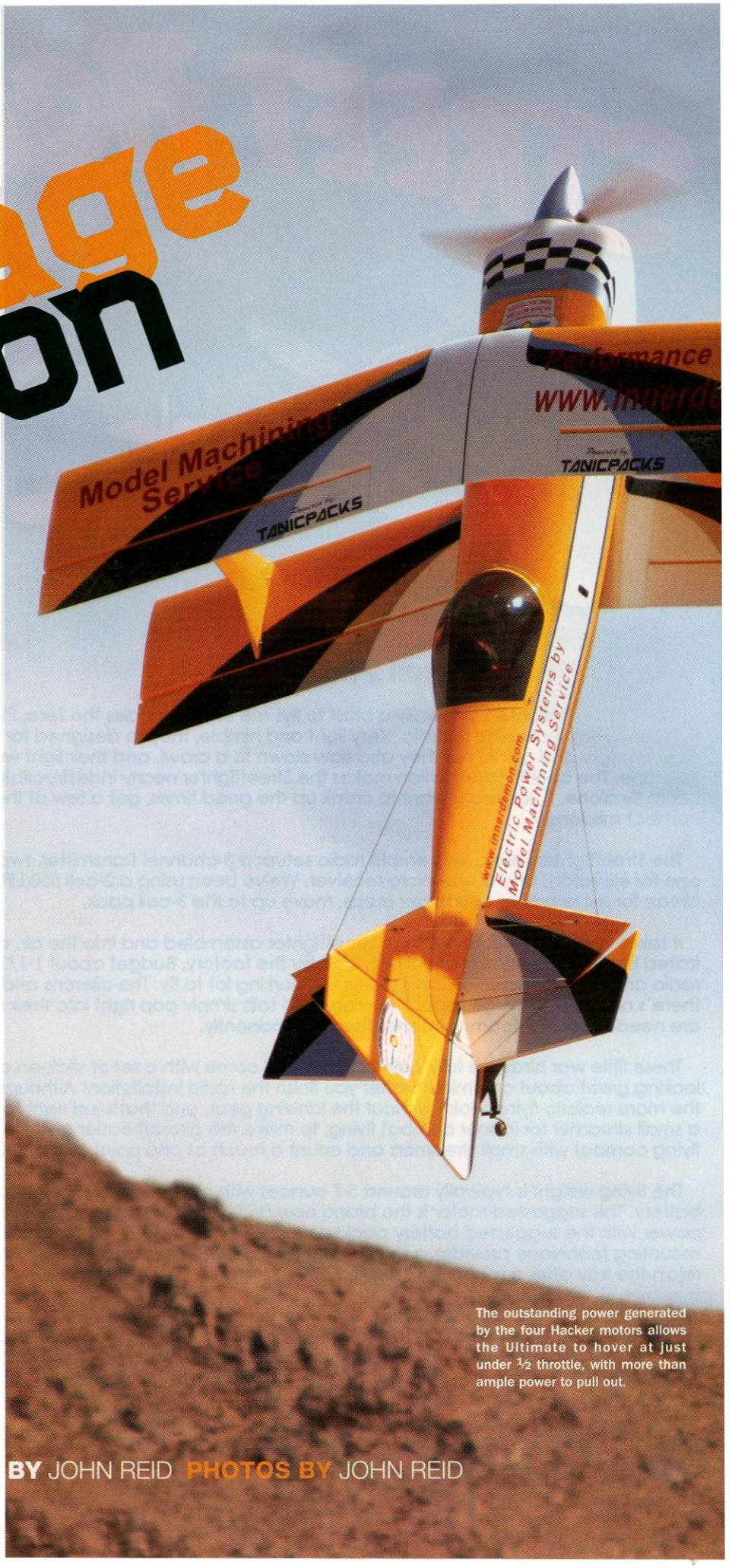
high voltage action

A GIANT-SCALE BIPLANE GOES ELECTRIC

ELECTRIC-POWERED AIRCRAFT are becoming very popular among RC fliers, and for good reasons: they offer quiet flights and require little or no cleanup at the end of the flying day. In the past two years, technological breakthroughs such as the evolution of Li-poly batteries and brushless motors have helped electric power find a niche in the large-size aircraft market. Even in IMAC contests, where gas-powered aircraft have long dominated, electric power is now coming to the forefront.

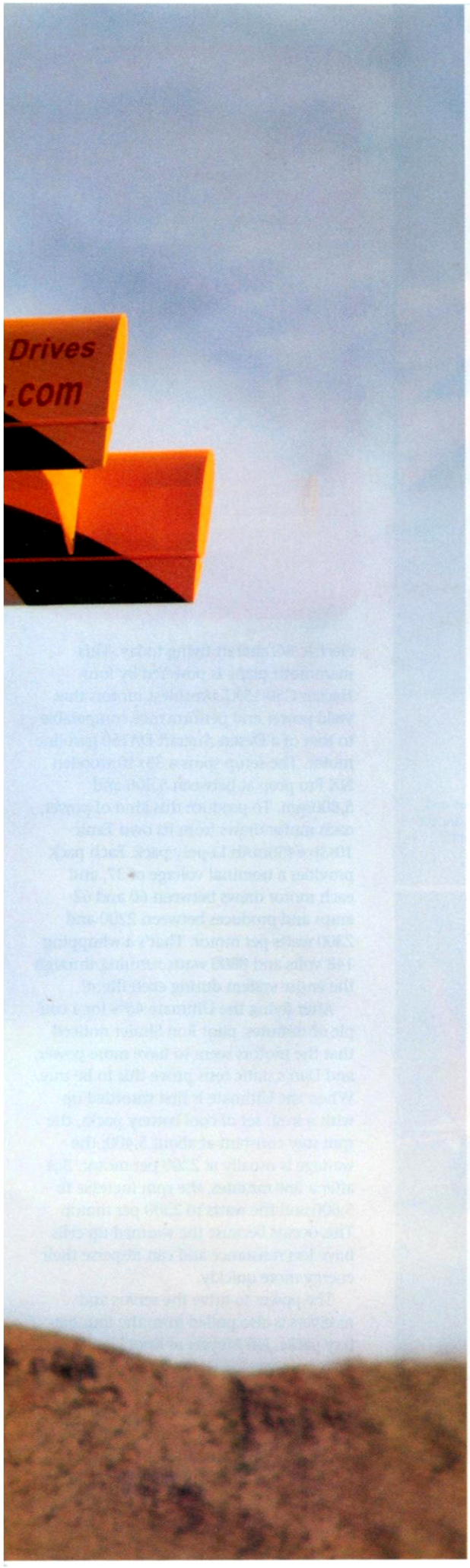
In response to this trend, Dan Redfern's company, Model Machining Service, makes Inner Demon gear drives. These were originally developed to give brushed motors the same power as expensive brushless motors. In this application, Dan's gear drives are used to combine four large brushless motors to produce the power needed for large IMAC aircraft.

We recently had an opportunity to test Dan's latest offering in the giant 46% Hangar 9 Ultimate—possibly the largest



The outstanding power generated by the four Hacker motors allows the Ultimate to hover at just under ½ throttle, with more than ample power to pull out.

BY JOHN REID PHOTOS BY JOHN REID



The Ultimate flies by in a nice, low knife-edge.

Dan connects the big Li-poly battery packs in pairs before securely strapping them inside the plane. With such heavy batteries, it's important that they be very secure inside the aircraft.

Stable hovers and torque rolls are not a problem with this aircraft.

Dan Redfern assembles the 46% Ultimate, while pilot Ron Shuler checks out the power components.

SPECS

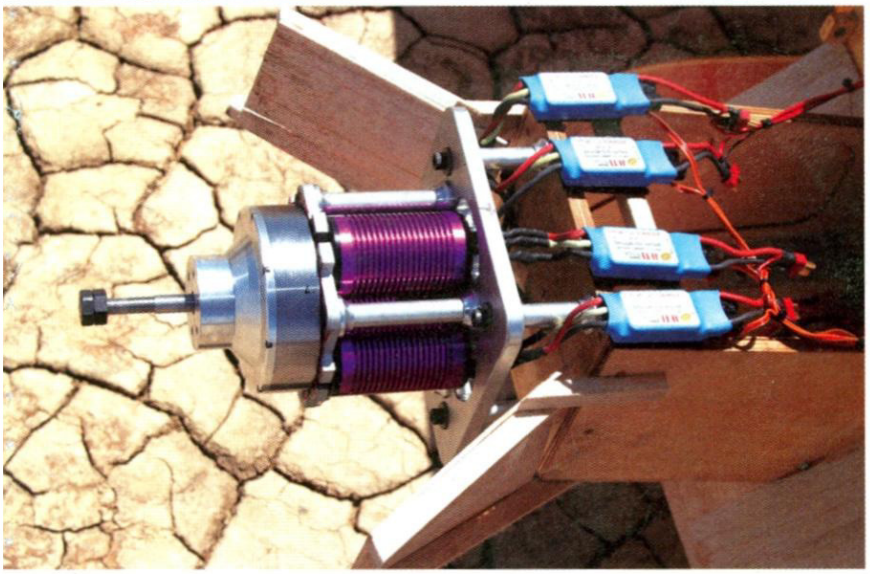
MODEL: Hangar 9 46% Ultimate ARF
LENGTH: 100 in.
WINGSPAN: 100 in.
WING AREA: 3,300 sq. in.
READY-TO-FLY WEIGHT: 47 lb.
WING LOADING: 32.7 oz./sq. ft.
GEAR RATIO: 6:1
MOTOR: Hacker C50-15XL (4)
PROP: 33x10 wooden NX Pro
ESC: Jeti 77-3p Opto (4)
GEAR DRIVE: Inner Demon Goliath
RADIO: JR PCM10X transmitter w/8 JR 8611 260 oz.-in. servos (4 aileron, 2 rudder, 2 elevator); 2 JR 9-channel PCM receivers; 3 JR matchboxes (1 for rudder, 1 for each elevator half)
BATTERIES USED: 1 Tanic 10s3p 6450mAh Li-poly per motor (total of 4 sets—2 5s3ps in series)
FLIGHT DURATION: 12 to 14 min.

electric RC aircraft flying today. This mammoth plane is powered by four Hacker C50-15XL brushless motors that yield power and performance comparable to that of a Desert Aircraft DA150 gasoline motor. The setup spins a 33x10 wooden NX Pro prop at between 5,400 and 5,600rpm. To produce this kind of power, each motor draws from its own Tanic 10s3p 6450mAh Li-poly pack. Each pack provides a nominal voltage of 37, and each motor draws between 60 and 62 amps and produces between 2200 and 2300 watts per motor. That's a whopping 148 volts and 8800 watts running through the entire system during each flight!

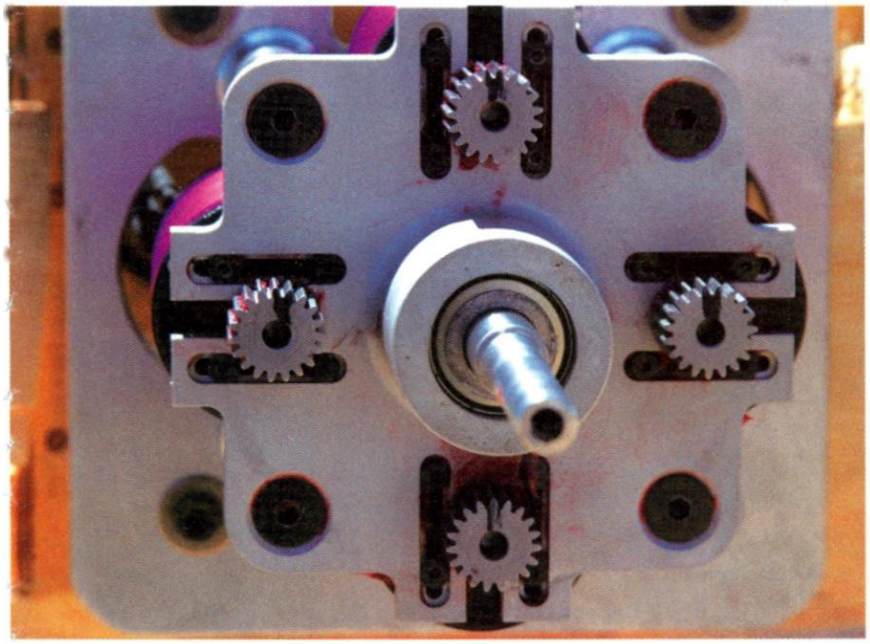
After flying the Ultimate 46% for a couple of minutes, pilot Ron Shuler noticed that the motors seem to have more power, and Dan's static tests prove this to be true. When the Ultimate is first throttled up with a fresh set of cool battery packs, the rpm stay constant at about 5,400; the wattage is usually at 2200 per motor. But after a few minutes, the rpm increase to 5,600 and the watts to 2300 per motor. This occurs because the warmed-up cells have less resistance and can disperse their energy more quickly.

The power to drive the servos and receivers is also pulled from the four battery packs. Jeff Meyers of Kool Flight Systems provided Dan with four special UBEC units that reduce the power to 6 volts for the receiver and servos. Dan has two UBECs per receiver; each has a special circuit built in so that if one UBEC or battery fails, the other one can still provide

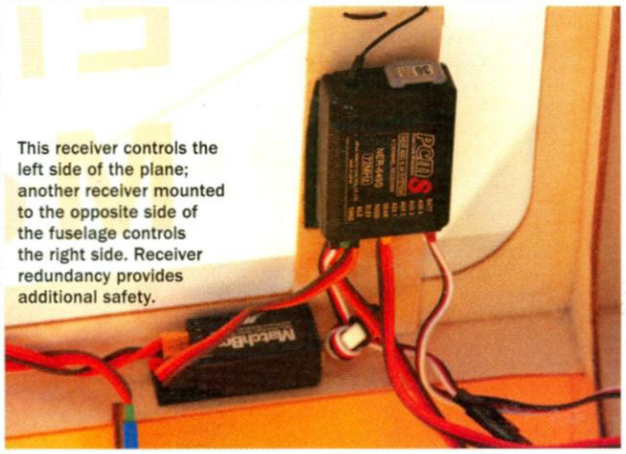
The 46% Ultimate takes to the air after a short rollout. This electric aircraft's power performance is quite impressive.



A view of what's under the hood. Each Hacker C50-15XL is directly connected to its own Jeti 77-3p ESC. Note the air dams that deflect the wind over the ESCs for cooling.



The first time power is supplied to the four Hacker motors, they will find their centers. A mark is made on the gears so that future alignments will not require the motors to be rearmed.



This receiver controls the left side of the plane; another receiver mounted to the opposite side of the fuselage controls the right side. Receiver redundancy provides additional safety.

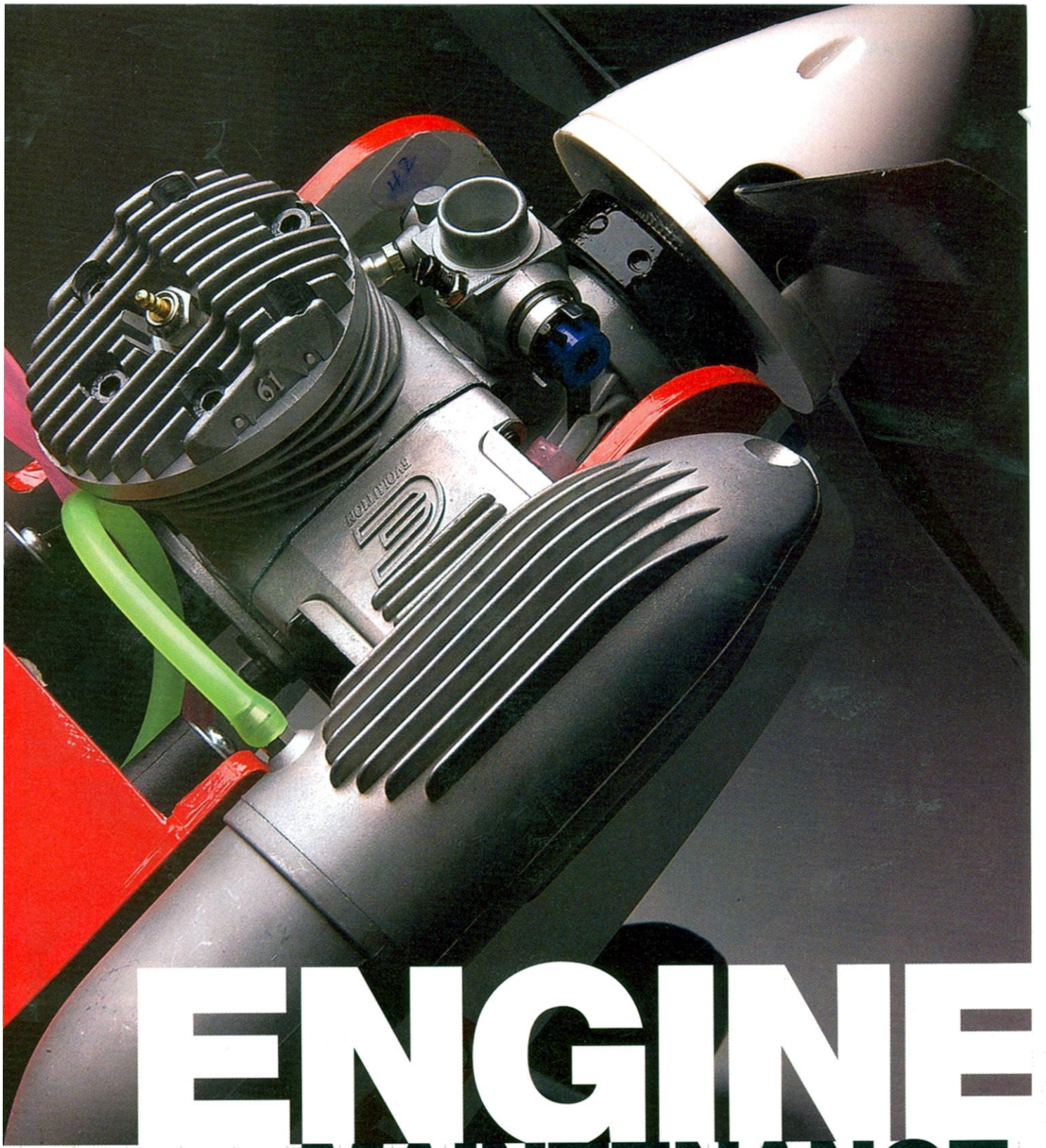
enough power to the system.

Model Machining Service's Inner Demon Goliath gear drive harnesses all the power produced by the Hacker C50-15XL motors and efficiently transfers it to the 33x10 prop. This well-constructed gearbox is durable and requires minimal maintenance (the gears are greased after every few flights). During the initial setup, the motors must be adjusted so that the pinion gears symmetrically engage the drive housing. To do this, the drive is removed, and each motor is plugged into a speed control which is then armed, and each motor is allowed to find its center. Alignment marks are made on the front of the pinions so that the next time the drive housing is removed, it can be attached without having to rearm the motors—truly a slick setup.

This aircraft was great fun to test, and it convinced us that electric power can give this 46% Ultimate biplane unlimited performance. IMAC competition may soon have a dominant new power source; electric power is here to stay. ✦

See the Source Guide on page 236 for manufacturers' contact information.

click trip MODELAIRPLANENEWS.COM TO SEE THE 46% ULTIMATE IN FLIGHT!



ENGINE MAINTENANCE

HOW TO TAKE CARE OF YOUR MODEL'S POWERPLANT

BY DAVE GIERKE

PHOTOS BY DAVE GIERKE, GERRY YARRISH & DERON NEBLETT

True or false: technical equipment requires regular maintenance. No, this isn't a trick question, but it's an important one nonetheless. The car gets a regular oil change; the lawn tractor is serviced at least once a year; the gutters are cleaned seasonally; furnace filters are changed; the cat's litter box?—I hope so! Why, then, do many modelers neglect their engines? Taking care of your engines isn't a waste of time. If you forget to perform routine tasks or haven't been shown how or what to do, read on!

HOW'D THAT GET IN THERE?

If you fly from a grass field, as I do, there's always a chance of a nose-over, during which dirt can find a way onto—and into—your engine. Landing a model outside the mown grass strip subjects it to a host of other pollutants, while an infinite variety of weeds can deposit all sorts of minute organic matter on everything, including the engine.

A shallow swale runs diagonally across our site, and models regularly track through it on landing without harm. After a rainstorm, however, poor drainage turns it into a long, shallow pond. During the rainy season, at least one pilot misjudges a landing and—to the entertainment of everyone present—splashes his airplane into the swale; it has been a tradition for more than 40 years! Generally, damage is minimal, but mud, grass, bugs and water usually have to be dealt with. In all cases, a cleanup is required before flying can be continued.

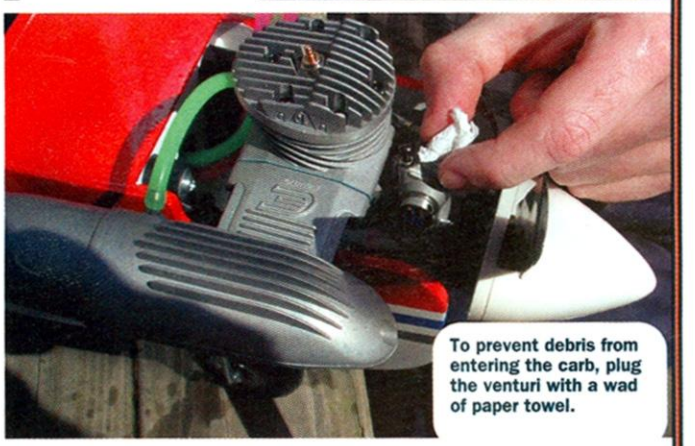
FLYING-FIELD CLEANUPS

Once upon a time, there were two areas through which dirt could enter the engine: the carburetor and the exhaust. Because most engines now operate with either mufflers or tuned exhaust systems, contamination through the exhaust doesn't pose the problem it once did. Dirt can still enter through the pipe's or muffler's exhaust outlet, but since it faces rearward, the chances of this happening are minimal—that is, unless you submerge the entire engine in our swale!

>Carburetor venturi When your engine gets dirty because your model has landed in the weeds, look first at its air intake. During

With the model on its nose, flush raw fuel onto the exterior and into the venturi with a fuel bulb or syringe.

Stubborn dirt can be removed from the fins with a toothpick or a similar soft-point tool.



To prevent debris from entering the carb, plug the venturi with a wad of paper towel.

With the model on its nose, squirt plane-cleaning solution (dish soap and water) through the fins and over the crankcase.

the engine's last microseconds of operation, this trouble spot serves as a miniature vacuum cleaner, ingesting anything that happens to be in the vicinity. This is where your syringe or fuel bulb comes in handy. Find an out-of-the-way location (not in the pits), tip the model up on its nose, and squirt a good dose or two of raw fuel into the carburetor venturi. Avoid rotating the crankshaft before doing this; if dirt is sitting on the crankshaft journal, you don't want it to fall into the induction port. If you're lucky, the induction port was closed, and nothing got into the crankcase. If you're the suspicious type, you may want to remove the engine from the model for partial disassembly. You'll certainly want to do this if you know that dirt has entered the crankcase—especially after a crash.

If dirt remains in the crankshaft's front housing (below the carburetor), it can wear away the seal area, increasing clearances and producing a loss of crankcase compression. This degrades the engine's idle performance while allowing a messy fuel leak from the engine's front bearing. When dirt penetrates the piston/cylinder-sleeve interface, it often produces damaging scratches (called "scores") in the softer piston. The bearing surfaces in connecting rods and piston wristpin holes are also candidates for excessive wear.

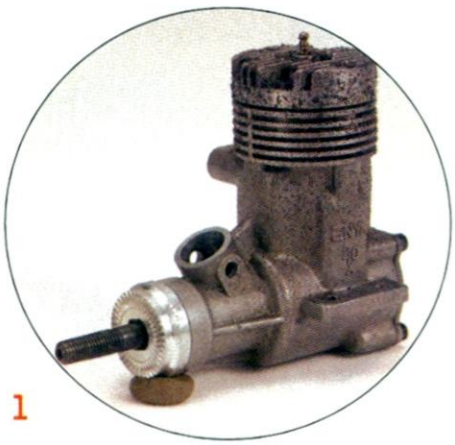
>Front crankshaft bearing If dirt is deposited behind the engine's thrust washer (sometimes called a "drive washer"), it may have entered the front ball bearing that supports the crankshaft. Some of these bearings are shielded to prevent this from happening, but you should clean the area with raw fuel squirted from a syringe, anyway. On engines with bushed crankshafts, dirt behind the drive washer can cause rapid wear of the engine's front housing; that leads to excessive shaft endplay and backplate wear. The best way to clean off this dirt requires removal of the prop nut, washer, propeller and thrust washer to allow direct access to the contaminated area. Unfortunately, many modern engines use a drive washer that locks onto the crankshaft with a collet (that is, a split-cone retainer). These sometimes fall rather easily off the shaft but may also require a "puller" to accomplish the task. O.S. sells a special puller for its engines; a battery-terminal puller works well for almost all engines that I've worked with over the years.

If you're at the flying field, and you find that dirt is packed between the rear of the drive washer and the front of the engine housing, and you don't have a puller, don't try to remove the drive washer. Instead, clear the dirt by squirting raw fuel through the gap and then forget about it. Whatever you do, don't pry the drive washer off with two screwdrivers! You will butcher the engine's front housing and probably the drive washer, as well.

>General engine cleanup Plug the carburetor venturi and the exhaust outlet of the muffler with small wads of paper towel. Stand the model on its nose, and squirt the engine with your plane-cleaning fluid. I use a plastic spray-pump bottle filled with 10-percent dishwashing detergent to 90-percent water. Pay particular attention to the cylinder and cylinder-head cooling fins, where dirt can be trapped. If necessary, use a toothpick or another soft instrument to clean them out. Carefully wipe away any excess cleaning fluid with a clean rag or paper towel. Reassemble the engine's components, and you're ready to fly again. Don't forget to remove the paper towel from the exhaust outlet. In the future, stay out of the ditches and weeds!

AT-HOME CLEANUPS

>Burned-on castor oil (varnish) Castor oil is the best protection your engine can have in case of a lean needle-valve setting, when the cylinder-head temperature soars. At high temperatures, the castor molecule is modified and forms a protective varnish on the piston and cylinder sleeve that usually prevents catastrophic mechanical damage. Castor oil also varnishes the outside of the engine, including the cylinder head, exhaust stack and muffler (wherever the temperature is the highest). Varnish is the ugly dark-brown stain that you can't remove with common solvents. Some modelers attempt to solve the problem by using fuels that don't contain castor oil, but in my opinion, this is shortsighted. Some claim that they don't mind the ugly appearance of castor varnish on their engine's exterior. Consider this: varnish acts as an insulator, so it reduces the effectiveness of your engine's cooling fins. A varnished engine will operate at higher temperatures than one without varnish.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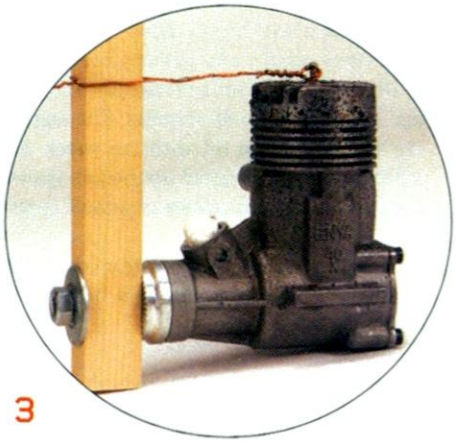
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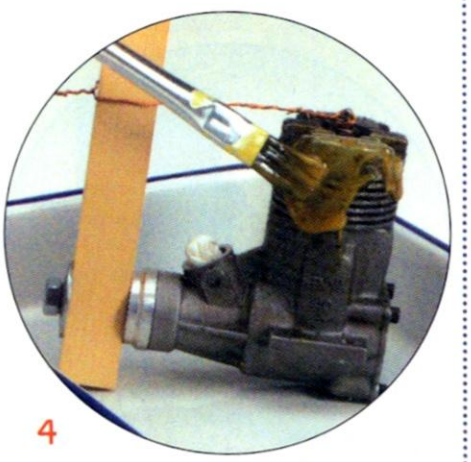
The numbered photos depict the removal of burned-on varnish.

1. First, remove the engine from the model and then remove the propeller, muffler and carburetor.

2. Next, plug the carb and the exhaust openings with paper towels.

3. Attach the engine to a "holding stick" (from Harry Higley's book, "All About Engines").

4. Apply Demon-Clean to the varnished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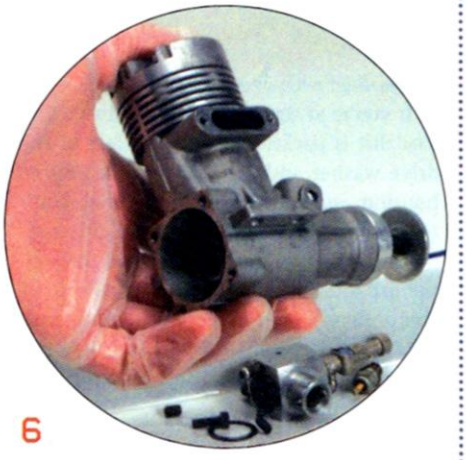
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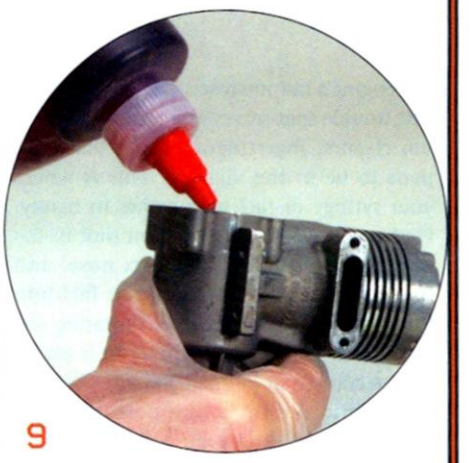
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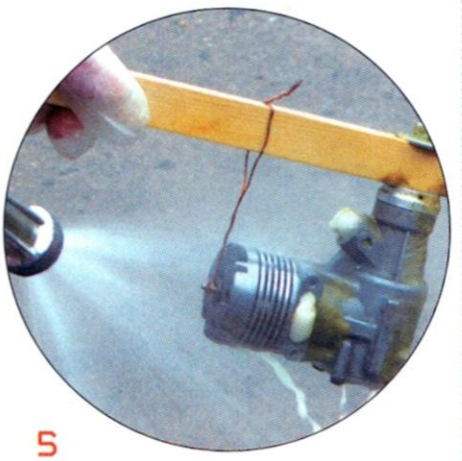
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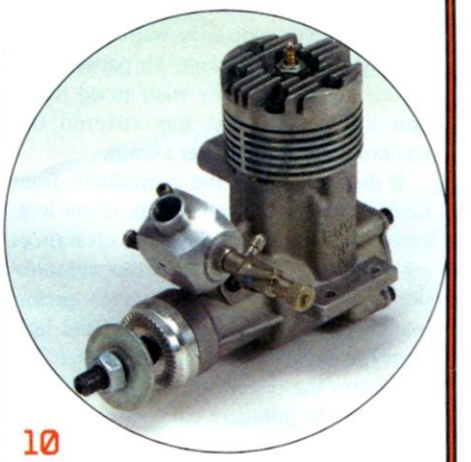
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areas with a stiff-bristle brush (be sure to wear safety goggles and rubber gloves).

5. Demon-Clean removes varnish and carbon in about 30 to 45 minutes. The engine can then be rinsed off with tap water. An old toothbrush will speed up the job. Heavy deposits sometimes require a second application.

6. Remove the glow plug, the rear cover, the muffler and the carburetor, and store them in a clean, safe place.

As mentioned earlier, dirt ingestion sometimes occurs during minor accidents, including nose-overs. If you think that dirt has entered the engine's crankcase through the venturi, don't take any chances; do a thorough internal cleaning.

7. Fill a glass container with enough lacquer thinner to submerge the entire engine. Note: don't use alcohol; it draws water and will leave rust spots on all ferrous parts of your engine. Dunk the engine into the solvent and out again without turning the crankshaft. The agitation will flush any particles of dirt out of the engine's interior. Resubmerge the engine, and turn the crankshaft over rapidly. This action will flush dirt out of the piston/cylinder and ball-bearing areas.

8. Remove the engine from the lacquer-thinner solvent; shake it vigorously to remove most of the fluid (be certain to do this outdoors or with the engine inside a garbage bag). Dry the exterior with a clean rag while allowing the thinner to evaporate from the inside.

While you're waiting, remove dirt particles from the lacquer thinner by pouring it through a paint strainer; store it in an appropriately labeled metal container for future engine cleaning.

9. Before reassembling the engine, lubricate the internal components with Marvel Mystery Oil. Don't use castor oil unless you're going to run the engine right away. Castor turns into a thick ooze that's tough to remove after only a few weeks. Turn the engine's crankshaft over several times to evenly distribute the lubricant. Be certain to coat the crankshaft and ball bearings (if your engine has them).

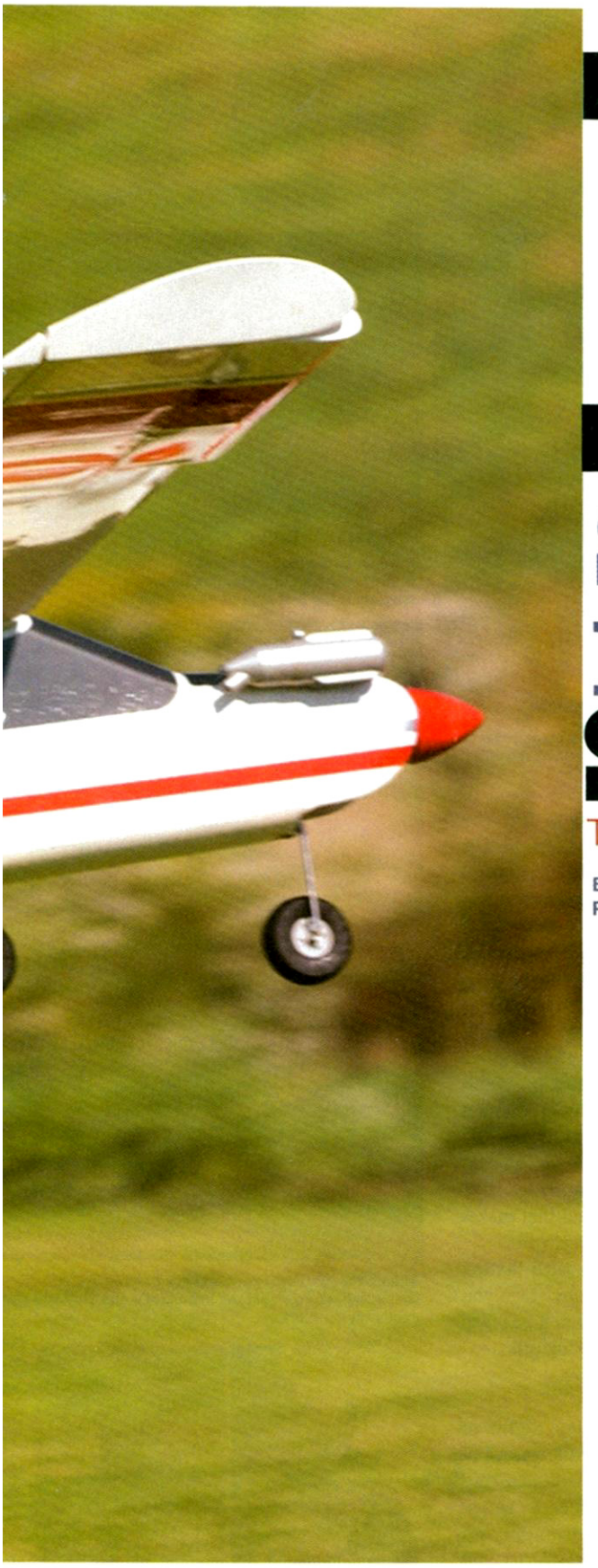
10. Replace the rear cover, carburetor, muffler and glow plug, and remount the engine.

CONCLUSION

Remember: taking care of your engines is time well spent. Perform the tasks described herein, and your engines will last a long, long time. ✈

See the Source Guide on page 236 for manufacturers' contact information.


HOBBICO
N310MF



The Hobbico NexSTAR is an ideal trainer. It's available with an onboard stability system that rights the model automatically.

10 steps for success

THE EASY WAY TO GET YOUR WINGS!

BY GERRY YARRISH
PHOTOS BY DERON NEBLETT, JON CHAPPELL & GERRY YARRISH

For first-timers, building and setting up a new model airplane is fun and rewarding all by itself, but the fun really begins once you get to the flying field and start flight training. With a correctly built model and a good familiarity with its operation, it's time for a little ground school.

The basics for success are a properly broken-in engine with a reliable idle, a set of fully charged radio batteries, the correct ground-support equipment and a beautiful day with a light breeze blowing straight down the runway. Let's get started!

1 The instructor

You and your instructor need to develop a training plan. Each flight session should have a goal and should build on what was learned during previous flights. Only after you've accomplished the task at hand should you proceed to the next one. A good teaching plan might include lessons on taxiing, takeoff procedures, flying straight and level, turning left and right, flying at low airspeeds, entering a stall with your model and learning how to recover from the stall, flying at lower altitudes and setting up for your first landing approach.

Remember to concentrate on keeping your model under control at all times, and adjust for wind conditions.

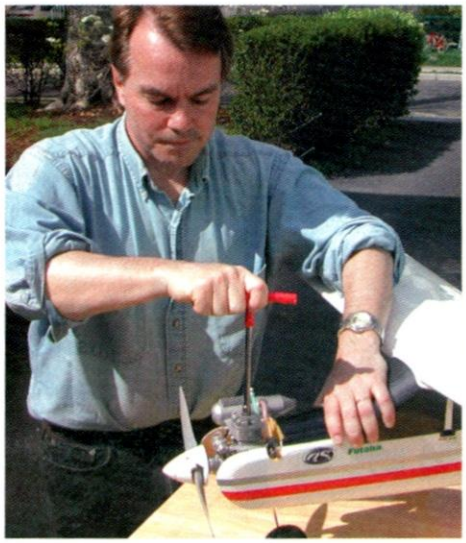
2 The buddy system

I highly recommended that you use the "buddy box" training system. This system uses a cable to connect the student's transmitter to the instructor's transmitter and allows the instructor to turn over the controls to the student with a switch. The radios have to be compatible for the setup to work, and information on these systems is available from most radio manufacturers.

During practice, the instructor uses his radio to take off and fly the model to a safe altitude. He then sets the model in straight and level flight and activates the trainer switch that transfers control to the student's radio. If the student gets into trouble, the instructor can simply release the switch to regain control. Compared with using a single transmitter shared between the instructor and student, the buddy box is much easier on the model as well as on the student's feelings. Many clubs consider the buddy box the preferred training system.

3 Taxi tests

The first thing to do after you've started the engine and checked its settings is to slowly taxi your model up and down the runway. Your instructor should let you get the feel of the model on the ground before you actually fly it. Notice that when you taxi downwind, steering (rudder) is slightly less effective than when you taxi upwind. With a tail-dragger, apply a little up-elevator to keep the tailwheel firmly planted on the ground. With a tricycle-gear model, a little down-elevator will be needed to hold the nosewheel down for maximum steering control.



Success at the flying field begins with preparation at the workbench. Become familiar with your model's radio and engine operation.

Taxiing is also a good way of learning "reverse steering." When the model is pointed toward you, left and right control seem reversed! This can be very confusing at first, but with practice, you'll quickly learn to automatically adjust when the model turns around, and it is heading toward you.

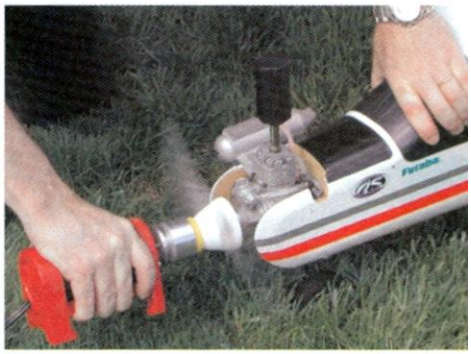
Practice advancing the throttle slowly to minimize the effects of engine torque on the model. If you advance the throttle quickly, the model will tend to swerve to the left. Correct for torque by applying a slight amount of right rudder as the throttle is advanced. Keep a light touch on the controls; a heavy-handed approach leads to over-controlling the model, and that makes things even more difficult to deal with.

Once you are comfortable with taxiing your model and can guide it anywhere you want without losing control, you'll be ready for that exciting next step—taking off!

4 Takeoff

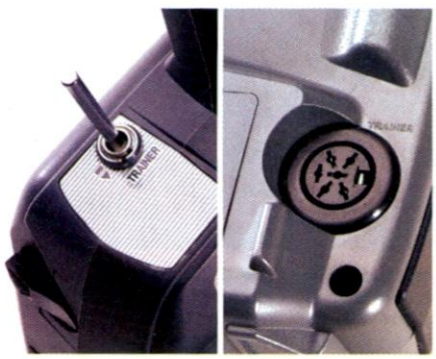
For the most part, the first few flights of your model will be under the full control of the instructor, and he will take off and land your model. After you've learned to anticipate your model's reactions to input and show confident control, your instructor will say, "Go ahead; you take 'er off this time!" As a rule, always take off into the wind, never downwind!

You'll find taking off is actually quite easy. Most trainers are positively stable and will climb all by themselves when you advance the throttle. Concentrate on maintaining



Have all of the proper support equipment when you're at the flying field. Starting and adjusting the engine properly is the first step to flight success.

A team for success! The buddy box training system uses a cable to connect the instructor's and student's transmitters.



The trainer switch on the instructor's transmitter (left) instantly transfers model control from one radio to the other. When the switch is activated and held in place, the student has control! The trainer cord plugs into the back of the transmitter (right).

RC Checklist

Here's a list of things to bring with you when you go to the flying field and things to check once you get there.

Model
- Wing
- Fuselage
- Wing hold-down bolts or rubber bands
- Engine (is the needle valve in the carburetor?)
- Transmitter (is the radio fully charged?)
- Is the radio operating, and are the controls moving in the proper directions?

Supplies
- Fuel
- Fuel pump
- Extra glow plugs, glow igniter and glow-plug wrench
- Extra propeller
- Prop wrench
- Paper towels and spray cleaner

Personal items
- Cooler with drinks
- Folding chair
- Sunscreen
- Sunglasses
- Large-brim hat
- Trash bag to keep the field clean

heading (direction) and pitch control. Slowly advance the throttle, and steer with rudder (add a little right to keep it going straight down the runway). Listen to the engine, and make sure that it's putting out full power. As the model gets light on the wheels, pull back slightly on the elevator stick, and bring the model's nose up slightly. Keep the wings level with the ailerons, and let the model climb out at about a 20- to 25-degree angle relative to the ground. Don't panic if the model jumps off the ground and heads up at a steeper angle. Ease off the elevator stick, and if necessary, apply a bit of down. Push the elevator stick forward slightly to keep the model at the proper climb angle.

Note that even during the climbout, you may have to keep a little right rudder applied so that the model stays straight on course. This is partly because of engine torque and P-factor (asymmetrical thrust) from the prop during the climbout. Once the model is at a safe altitude (100 to 150 feet), it will soon be time to turn the model around.

5 Banking and turning

After takeoff, the next important thing to learn is how to turn the model left and right. Without this basic maneuver, we'd lose a lot of models over the horizon. Ailerons make the model roll, and this is the first step in making a turn. Apply a little left or right aileron to bank the model 15 to 20 degrees from level (and away from the pit area); then add some up-elevator to bring the model into the turn. To increase or decrease the turn radius, add more or less elevator while you maintain a constant bank angle with aileron input. You also have to increase the throttle slightly to compensate for the added drag caused by the turn. If you don't adjust throttle, the model will slow down and begin a descending turn. Once the model is on the new heading, release up-elevator, and apply a little opposite aileron to bring the wings back to level. Bring the throttle back to the power setting for straight and level flight. You're now flying in a new direction. Wow!

6 Lefts and rights

When flying out in a straight line away from yourself, a 180-degree turn will bring the model back toward you. Remember, your left is no longer the model's left. They're now opposite! A simple way to keep your model's flight path level is to move the aileron stick toward the lower wing panel. As you look at the oncoming model, if the wing on the right side is low, move the stick to your right. This technique works really well when you are learning to fly the model toward yourself.

For most students, it's hardest to learn how to react properly to the model's attitude when it is very far away and it looks like a small, dark silhouette. Remember that the model always rolls in the same direction whether it's coming or going. When the model is moving away from you, if you move the aileron stick to the left and the left wing drops, it's heading away from you. The opposite (left aileron stick makes the wing on the right drop) means that it's heading toward you. The sooner you're able to react to these situations, the sooner you will become a proficient RC pilot.

It is important that you become comfortable during all maneuvers. You should be able to turn both left and right and maintain a constant altitude during the turns before you move to the next step: landing.

7 Landings

Takeoffs are optional; landings are always required. How well we bring the model back into contact with the ground is directly proportional to the model's lifespan, and there is only one way to become good at landings—practice!

Start practicing your landings at a safe altitude (about 100 feet), and learn how your model reacts at low-throttle settings. Control will feel sluggish and less crisp. If you don't slow the model down, you'll never make a successful landing, so the first thing to do is to trim the model to fly slowly without losing altitude. Bring the throttle back, and pull the nose of the model up slightly to maintain altitude. This higher angle of attack (AoA) will slow the model's airspeed. Up-elevator increases the AoA, and down-elevator decreases it. A greater AoA slows the model; a lesser AoA increases airspeed. The model's descent is controlled with throttle. You want to land the model a bit above its stall speed. You have to learn what that speed is and then practice flying into and out of the stalled condition. When you know when the model will stall in the air, you'll be able to land on the ground.

Figure 1. Leveling the wings.
When the model is flying toward you, left and right commands feel reversed. Move the aileron stick toward the lower wing to raise it!

ILLUSTRATIONS BY RICHARD THOMPSON

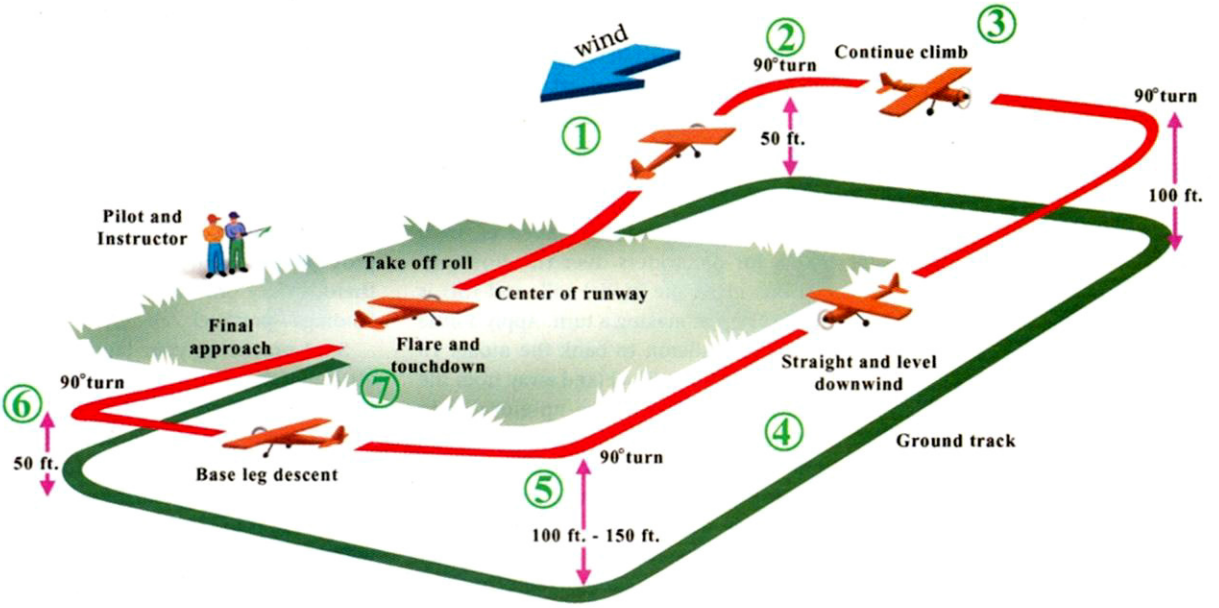


Figure 2. Your first solo flight

1 Take off and climb into the wind with full power.
2 At 50 feet, make a climbing 90-degree turn away from the pits.
3 Continue climbout, and make another 90-degree turn.
4 Fly straight and level downwind, parallel to the runway. (Pull power to ½.)
5 Turn 90 degrees to the base leg; reduce power and airspeed.
6 At about a 50-foot altitude, turn 90 degrees to final approach, align the model with the runway centerline, maintain descent rate, control altitude with throttle and keep the wings level.
7 At about 2 feet off the ground, reduce power to idle, and pull back on elevator to begin flare. Touch down on main wheels, and use rudder to steer until the model comes to a stop.

Setting up for landing

There are four basic parts to the landing pattern: the downwind leg, the base leg, final approach and the flare. As with the takeoff, it's best to have your model flying into the wind for landings. This keeps the airspeed as high as possible in relation to the model's speed over the ground (ground speed). The turns from downwind to the base leg and from the base leg to the final approach should be 90 degrees and done with a shallow bank of about 15 to 20 degrees. The only difference between these turns and those you've already learned is that now the throttle has been reduced and the model is descending.

The approach

While traveling downwind and straight out at the far side of the runway directly in front of you, pull the throttle back to about ½, and pull the elevator trim back a little to slow down the model. As the model descends to about 50 feet, turn 90 degrees to the base leg, and then straighten the wing back to level. Control the descent with the throttle, and control your airspeed with elevator. Don't stall the model by pulling all the way back on elevator stick, but fly just above the stall speed. Make another 90-degree turn to enter the final approach. Set up the model for landing by lining it up with the runway's centerline. Establish a descent angle that will bring your model into contact with the ground just as the model slows to the stall speed.

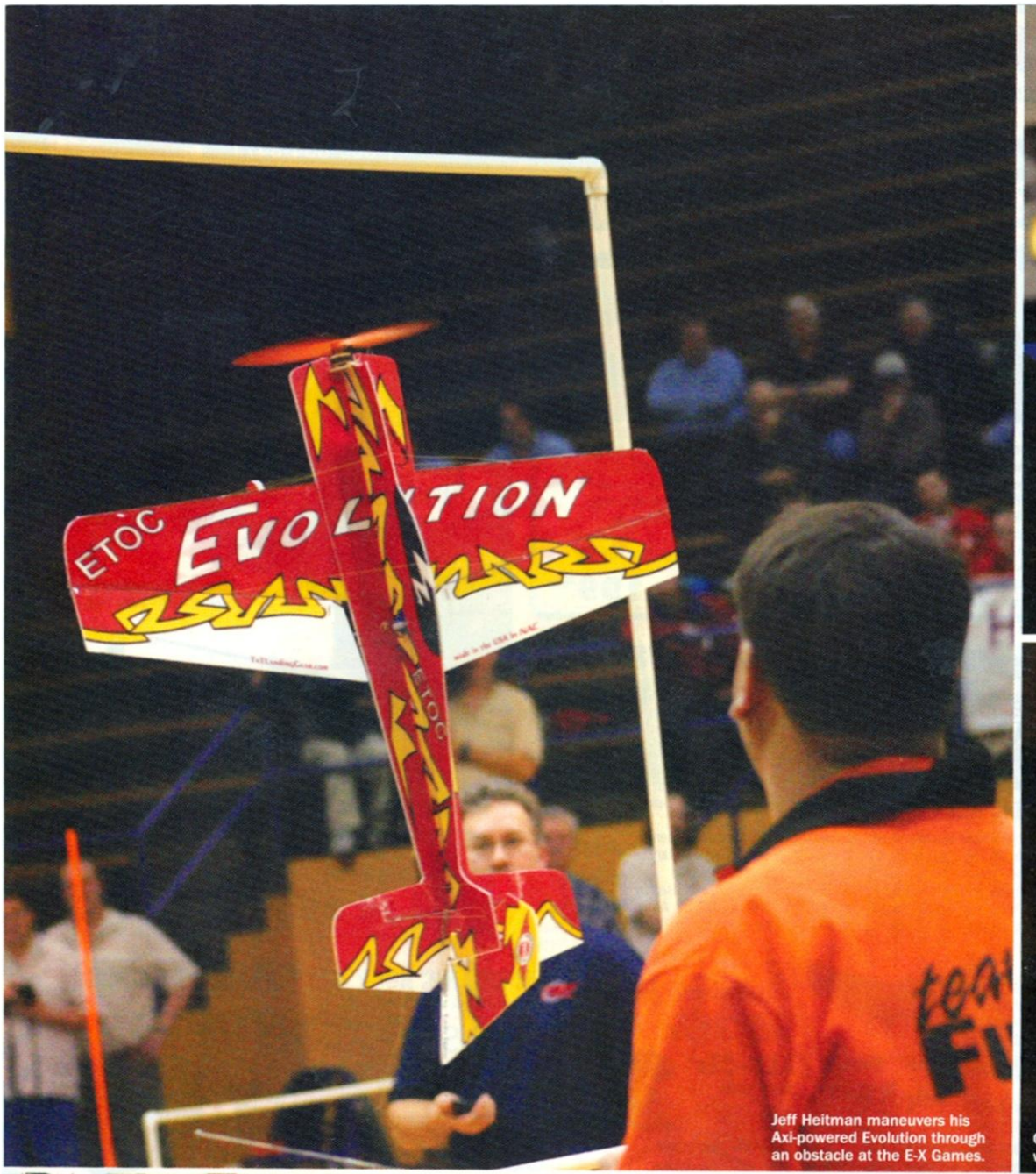
Touchdown

The flare (pulling the nose up gradually just before touching the ground) removes excess airspeed and helps prevent the model from bouncing back into the air because it was flying too fast. After the flare, allow the model to settle easily onto the runway, and start using rudder to keep the model rolling straight ahead until it comes to a stop.

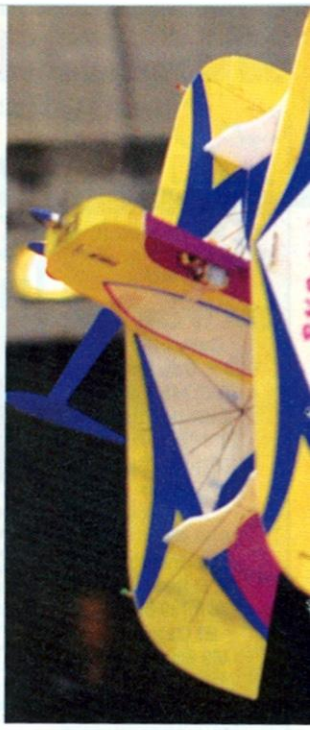
Phew! That wasn't all that hard, was it? Nothing gives such a feeling of satisfaction as that first successful landing. You'll spend the rest of your hobby career perfecting your landing skills. Crosswinds and gusty days always challenge the modeler to improve. This is where practicing touch-and-go's comes in handy; just remember always to keep ahead of the model mentally and know what you're going to do next. Plan your flight, and fly your plan. Stay in control.

So there you have it; you've come to the flying field, you've committed aviation, and you've made that first great landing without breaking anything. Congratulations, kid; you're in! Now all you've got to do is have fun and practice. ✚

That first successful landing—nothing could be sweeter!



Jeff Heitman maneuvers his Axi-powered Evolution through an obstacle at the E-X Games.



Chip Hyde put on quite a show with his Foreplay triplane.

The ETOC winners, from right to left: Scott Foster, Shawn McMurtry, Quique Somenzini, George Hicks, Josh Glavin, Sebastiano Silvestri and Andrew Jesky.

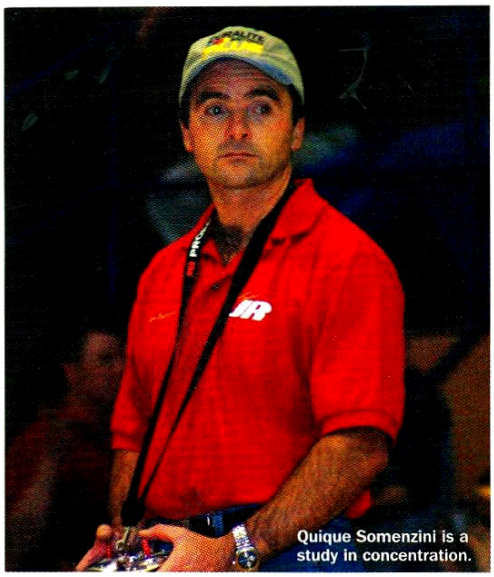
The stab of Jon Leyland's bipe is about to strike one of the many crossbars the contestants had to conquer.

ALL-OUT 3D ACTION

THE BEST STRUT THEIR STUFF AT ETOC

BY THE MODEL AIRPLANE NEWS CREW PHOTOS BY STAFF

Have you ever attended A full-scale airshow? How about a giant-scale RC aerobatic competition? If you've attended either type of event, you'll agree that it's awe-inspiring to watch full-scale and large, radio-controlled models perform seemingly unimaginable maneuvers with grace and precision.



Quique Somenzini is a study in concentration.

George Hicks (left), last year's ETOC winner, puts in a flight with his helper, Jon Leyland.

IT'S AN ETOC!

The second annual Electric Tournament of Champions (ETOC)—brainchild of Tom Kroggel—was held earlier this year at the Waite Gymnasium in Toledo, OH. Tom works for TNT Landing Gear Products of Swanton, OH, and he has been involved in RC for many years. His products are used in competition RC aircraft all over the world, so he is no stranger to the competitive side of the sport. While watching local wonder-boy pilot Andrew Jesky use his 3D flying skills to dazzle the crowd at a fun-fly, Tom thought that it would be neat to field a competition in which all of the world's top pilots would compete to see who has what it takes to be named the best indoor RC pilot. Yes—*indoor*. Unlike other flying events that you may have seen, the ETOC was held in a high-school gymnasium. The event's main goal is to promote the hobby and allow people to explore technology and flight maneuvers in a way they've never been able to before.

The inaugural ETOC in 2004 brought the world's best RC pilots—including Quique Somenzini, Jason Shulman, Chip Hyde, Mike McConville and many others—together. ETOC was such a success that Tom decided to enhance the 2005 competition by holding it in a larger venue and inviting more pilots (see the Pilots' Chart sidebar for participants' names and order of finish).

With more than 1,800 spectators and 18 of the best 3D RC pilots in the world, this was the largest indoor flying event ever. The competition consisted of three elimination rounds in which pilots performed two-minute freestyle routines to recorded music. The fans couldn't wait to see what this newest craze in the hobby was all about.

THE RULES

Aircraft flown had to have a flat, foam wing and could be mono-, bi-, or triplanes. With design rules that are pretty much wide open, the ETOC boasts some unique and truly incredible aircraft. Have you seen the E-flite Tensor 4D from Horizon Hobby? You undoubtedly have, as it was the plane designed and flown by George Hicks that won the 2004 ETOC. The Yak-54 flown by Quique Somenzini the year before is now available from E-flite as well. Having seen what was flown at the event this year, doubtless some of those aircraft will be on the market later this year or early next! Tom Kroggel's vision of expanding the hobby has definitely become a reality.

AIRBORNE ARTISTRY

As the event unfolded, flight after flight left viewers mesmerized by the gravity-defying aerobatics they were watching. The graceful style of Quique Somenzini flying his new biplane ... Mark Leseberg's always impressive low, rolling circles ... the huge smile on the face of the extremely talented Mike "Showtime" McConville ... and the artistic performance of this year's second-place winner, Shawn McMurtry; each flight was more impressive than the next. Young up-and-comers, including Andrew Jesky and Josh Glavin, really hit this competition hard. Traveling all the way from Italy, Sebastiano Silvestri joined the competition to fly his own-design biplane and placed an impressive sixth overall.

DARK HORSE

It was, however, a lesser known pilot who dominated the night. Scott Foster left the crowd awestruck with his Nikitis Aircraft "Animal" 4D airplane outfitted with a variable-pitch (reversible) propeller. This new technology in propulsion allows the pilot to control the propeller's pitch up to and including negative pitch, just like a collective-pitch helicopter. In essence, the plane can fly backwards. From the moment his flight began, Foster's plane was launched backwards with the prop facing the ground; this guy's performance was not to be missed. Just when the spectators thought they'd seen it all, Scott's "Animal" performed maneuvers that no one had ever seen before, including an inverted torque roll that left the crowd cheering! Yes, you read that correctly; Scott had his plane spinning on axis and hovering with the propeller facing the ground. Incredible!

The ETOC was definitely a glimpse

Frank Noll Jr. hovers his Great Planes FlatOut Reflection into and out of a box.

PILOTS' CHART

1. Scott Foster
2. Shawn McMurtry
3. Quique Somenzini
4. George Hicks
5. Josh Glavin
6. Sebastiano Silvestri
7. Andrew Jesky
8. Chip Hyde
9. Jason Shulman
10. Mike McConville
11. Darren Eaton
12. Jon Leyland
13. Frank Noll Jr.
14. John Glezellis
15. Jason Noll
16. Mark Leseberg
17. Matt Mahnke
18. Jeff Pfeifer

Scott Foster, this year's ETOC winner, had his helper release his plane tail-first. The reversible-pitch prop made this possible.


Here's a close-up of the reversible-pitch prop on the nose of Scott Foster's ETOC-winning "Animal" 4D foamie.

Mark Leseberg puts his model through the E-X Games obstacle course.

into the future of RC technology—a very exciting time for everyone who loves this hobby.

E-X GAMES

As if the excitement of ETOC wasn't enough, this year, TNT Landing Gear Products decided to launch a brand-new competition: the E-X Games. These games brought the ETOC pilots back for a chance to showcase the ultimate in control and precision of their aircraft—an RC Olympics, if you will.

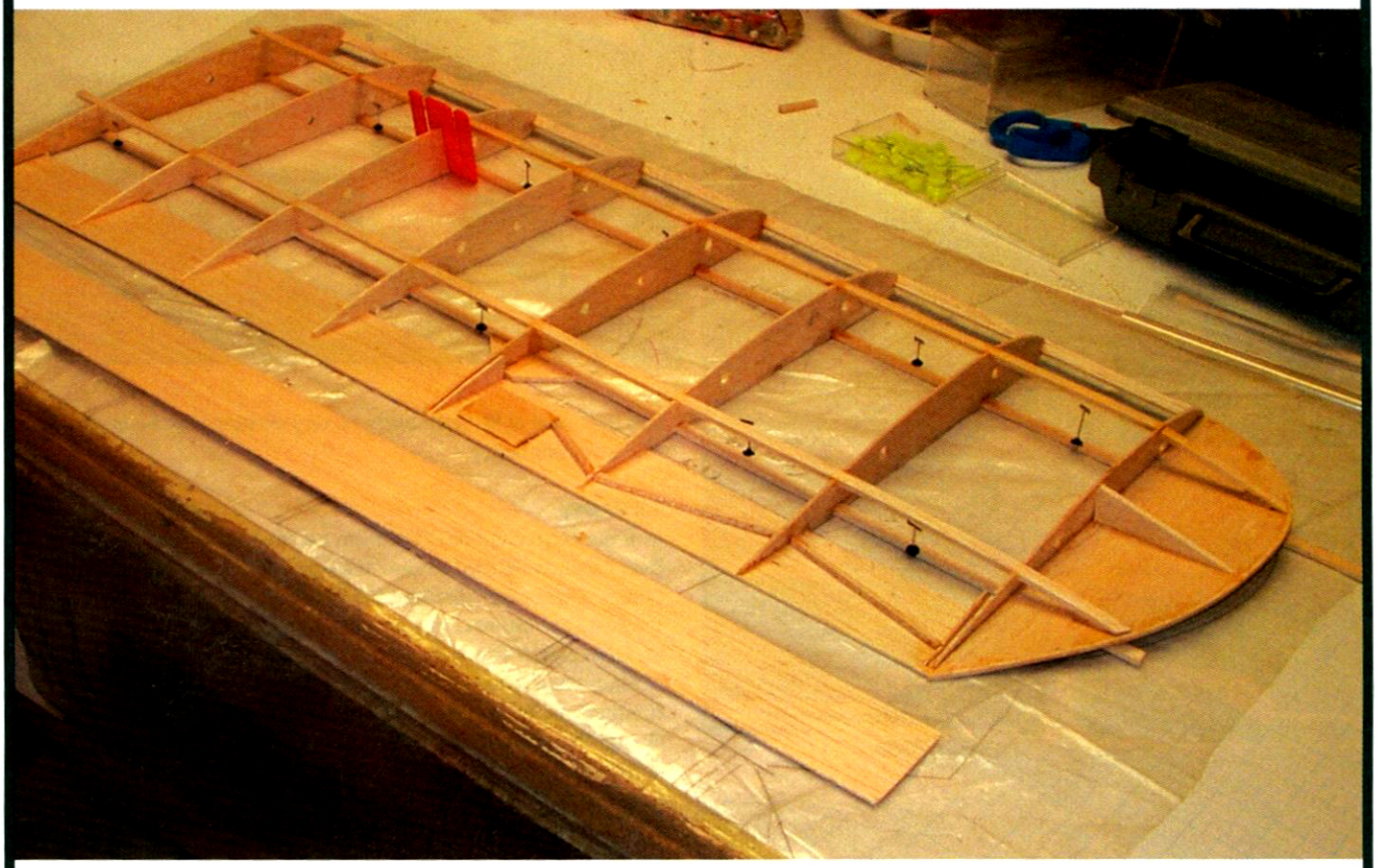
Pilots were pitted against one another—and against the clock—to complete the RC torture course. The first leg of the event was an aerobatic "limbo" in which pilots not only had to fly their aircraft under a pole, but they also had to make a couple of loops so that their planes cleared a pole at the bottom of the loop. If pilots made it through phase one, and their planes were still flying, the next obstacle consisted of vertical poles where pilots had to maintain knife-edge flight and fly through the poles while keeping their craft below the poles' tops. Sound easy? I assure you that it took the world's most precise thumbs to make it through. The final aisle of obstacles consisted of boxes where pilots had to maintain hover, drop into the box and then fly out the side. They then had to fly under another limbo pole while still in a hover, enter the side of the last box and hover out the top. To finish the competition, pilots had to hover their aircraft over a garbage can and drop their tails into the can's center so far that the leading edge of their stabilizers dropped below the can's top.

The E-X Games were fun to watch and evoked an appreciation of these pilots' skills. Although "carnage" seemed to be the word on everyone's lips that night, the overall experience was spelled f-u-n.

In the end, Jason Noll took the victory when he completed the course in the shortest time. Shawn McMurtry came in second, and Mark Leseberg was third. The night was a huge success, and I'm sure that the E-X Games will return to Toledo next year to an even larger crowd and even more world-class pilots.

Kudos to Tom Kroggel and his team for their dedication to expanding the hobby and bringing tons of new people into the sport. Events like this bring products such as the E-flite Tensor 4D and the new variable-pitch propeller setup to market. If you are in Toledo next April, be sure to attend.

Those of you who could not be there have not been forgotten! RCUniverse.com, a primary sponsor, has photos and videos of all the flights on its website. Take the Click Trip, and visit rcuniverse.com/magazine to catch all the action. In addition, SKS Video Productions is producing a video of both events, and it will be released soon. +



9 Steps to Easy Ribs

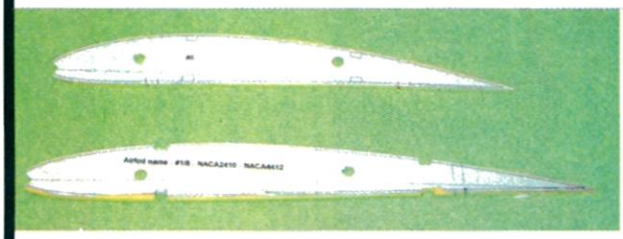
A QUICK WAY TO SPEED WING CONSTRUCTION

BY ROY DAY **PHOTOS BY** ROY DAY

MANY BUILDERS THINK THAT MAKING RIBS is the most time-consuming part of constructing a built-up wing. This is particularly true if the wing planform is anything other than a straight, constant-chord design. The sandwich method shown here works well and can be used for any planform (constant-chord wing and tapered wing). In addition, you can vary the airfoil shape from the root to the tip. For this particular example, the wing planform is tapered, the root rib is a NACA 2410 airfoil, and the tip rib is a 4412. This combination offers benign stall characteristics without tip-stalling. Follow these nine steps for a quick and easy way to make ribs.

1 **Attach the paper templates for the root and tip ribs to ⅛-inch-thick plywood, and cut out the plywood templates with your band saw, leaving about 1/16-inch extra all around.**

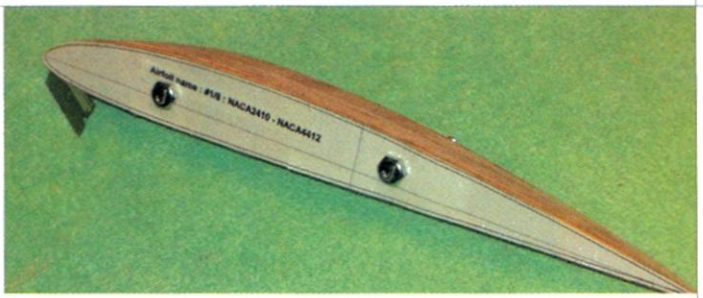
2 Finish shaping the root-rib template with a disc sander.



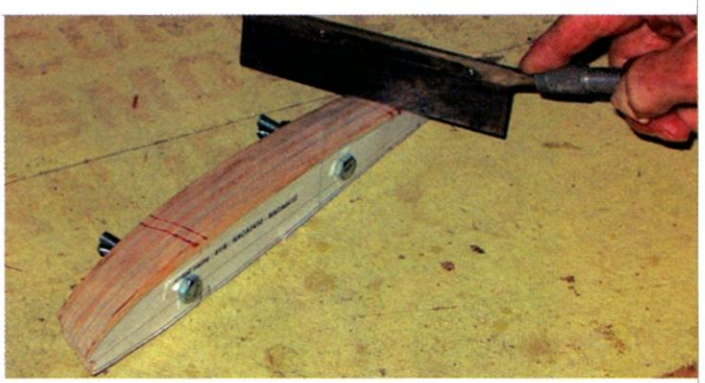
3 After you've sanded the root-rib templates's edges smooth, repeat the procedure for the tip-rib template.

4 Cut the rib blanks out of balsa sheet for all of your ribs except the root and tip ribs (we'll work on these later). If you use thin, 1/16-inch balsa for the ribs, you can include blanks for both wing panels (two blanks for each rib, excluding the blanks for the root and tip ribs). Clamp all the blanks together with your root- and tip-rib templates, and drill holes through the stack for 1/4-inch bolts. Bolt the blanks together and then roughly cut the stack with your band saw.

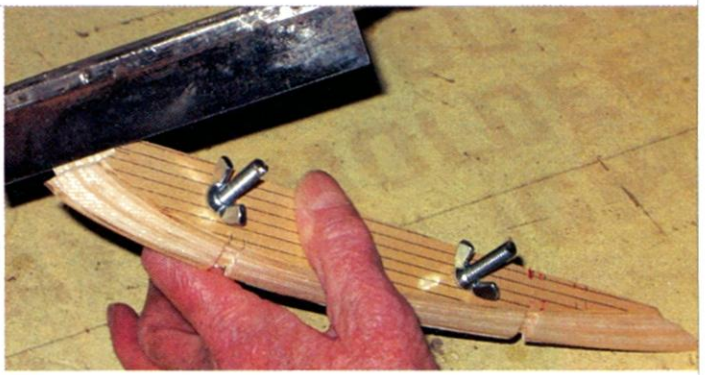
5 Use your disc sander to shape the stack accurately to the root and tip templates. Be careful not to sand into the plywood templates.



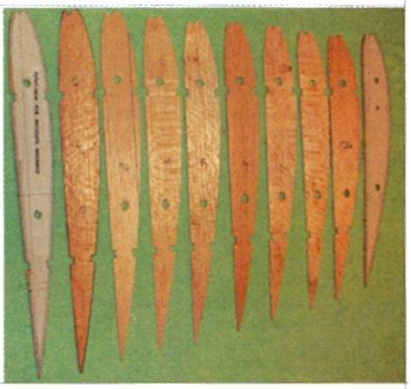
6 Now you have a smooth sandwich of all the ribs except the root ribs and the tip ribs.



7 Cut the slots for the spars. Measure the positions of the spars on the root- and tip-rib templates, and cut the slots carefully.



8 Cut the nose of the rib stack to suit whichever type of leading edge you plan to install. For this example, I notched the nose of the rib stack to accept a 1/4-inch-square balsa stick. Now disassemble the rib stack and use the plywood templates to cut the root and tip ribs. If you had cut them out as a part of the rib stack, they would be slightly too small.



9 Now, in a relatively short time, you have made a complete set of ribs for both panels of a tapered wing. Use this technique the next time you scratch-build a model, and you'll really speed up the job.

Model Airplane News

'05 BUYERS' GUIDE

The AirBorne Models CAP 232 makes a knife-edge pass for the camera. This new, .40-size sport-scale model is a carbon copy of Mike Goulian's full-size, world-class show plane. (Photo by Jerry Smith.)

With more than 600 products to choose from, the *Model Airplane News* Buyers' Guide is the ultimate resource for everything RC: aerobats, sport planes, park flyers, engines, motors, radios, tools, hardware ... you name it, you'll see it here. It's easy to find just what you're looking for, and we'll bet you discover some new must-have planes and gear, too. Enjoy!

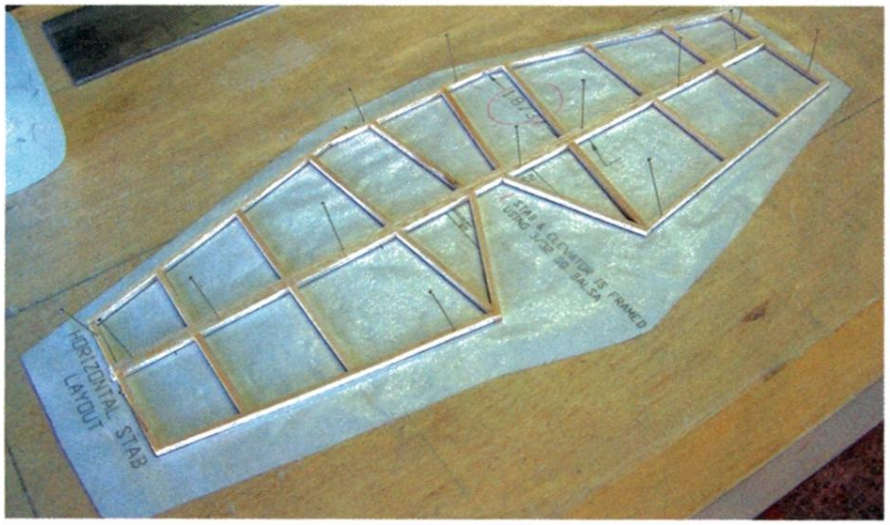
BY PAT TRITLE > PHOTOS BY PAT TRITLE

e Mini Ultimate Biplane on its
iden flight. The model lives up
its reputation as a very nimble
d aerobatic little airplane—
en without ailerons!

MINI ULTIMATE BIPLANE

A SMALL ELECTRIC AEROBAT WITH SPUNK

MANY YEARS AGO, I DESIGNED A 20-INCH-SPAN, free-flight Ultimate biplane, and when it proved to be a solid, stable-flying model, I immediately began to think about how I could convert it to RC. Back then, however, such a conversion would have required the use of very specialized—and by today's standards, expensive—equipment, so I put the idea on hold for a while. Now, with the availability of mainstream sub-micro radio components and the little GWS IPS drive systems, the time is perfect for this RC Mini Ultimate Biplane.



The basic structure is built directly over the plans. The tailplanes are of the basic "stick frame" type of structure—strong and light.

SPECIFICATIONS

MODEL: Mini Ultimate Biplane
TYPE: electric aerobat
WINGSPAN: 22 in.
LENGTH: 26.5 in.
WEIGHT: 5.7 oz.
WING AREA: 175 sq. in.
WING LOADING: 4.6 oz./sq. ft.
RADIO REQ'D: 3-channel (rudder, elevator, throttle; ailerons optional)
RADIO GEAR USED: 2 Cirrus CS-4.4 servos; Berg Micro Stamp receiver
DRIVE SYSTEM USED: 4:1 geared GWS IPS; 5A ESC w/BEC
PROP USED: GWS 8x6
BATTERY USED: 2-cell, 340 or 700mAh Li-poly

ABOUT THE DESIGN

The idea behind the Mini Ultimate Biplane was to design a park flyer that would be appropriate for novice "small airplane" builders yet be sufficiently appealing to experienced builders and fliers who would want to add ailerons and eliminate the dihedral. With only a little extra effort, pilots who want serious performance can easily produce an all-out hot-rod! Although the model was designed for the IPS 4:1 drive unit, it has plenty of room up front for a high-performance brushless motor that will offer noteworthy aerobatic performance.

The Ultimate is basically a stick-and-tissue model—strong and light! The model is small enough that the wings need not be removable, and it's also very easy to set up; the cabane-strut arrangement is self-aligning, which makes it a breeze to mount on the top wing. All you have to do is decide whether you want a simple park flyer or a full-blown aerobat.

BUILDING THE MODEL

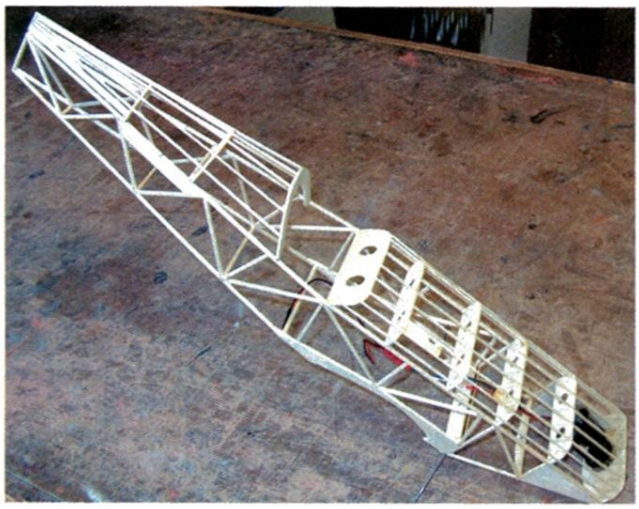
Start by cutting all the parts out of the patterns provided. Use the appropriate wood sizes or the laser-cut "Short Kit" available from Pat's Custom Models.

Frame the vertical and horizontal stabilizers using the wood sizes shown. When the glue has dried, remove the parts from the plans, and sand the edges round. Cut the hinge slots with a sharp hobby knife. The hinges are made of ⅛-inch-wide strips of light CA hinge material. Fit the hinges, but don't glue them into place until the final assembly. Bend the tailwheel bracket out of 0.032-inch steel wire, and glue it into the rudder.

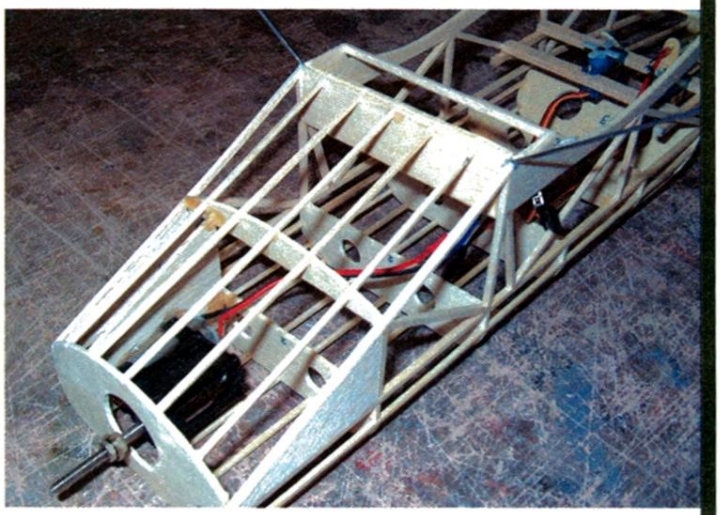
WINGS

Frame the wings directly over the plans. Pin the spars on the plan, and glue the ribs into place at each location, except at the dihedral breaks. Shape the trailing edges before you glue them into place; it's a lot easier that way. Then glue the leading edges into place to complete the basic wing structures.

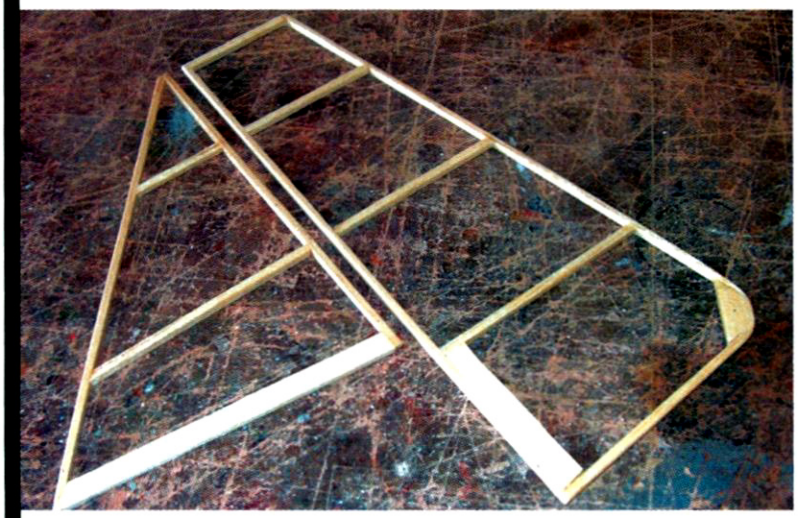
Raise the bottom wing's tips, and block them up ⅝ inch; then glue the spar joints and the remaining two ribs into place. Block up the top wingtips ¾ inch, and glue the center rib into place. Remove the wings



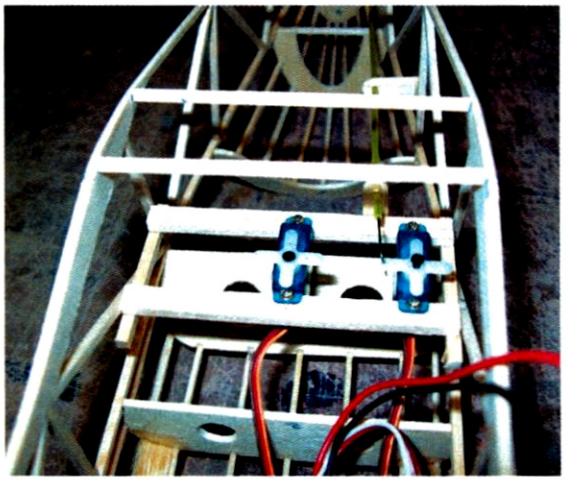
The fuselage assembly is a simple truss arrangement filled out with formers and stringers.



Balsa formers and stringers on the forward fuselage bottom round out the basic trussed structure.



The rudder and fin assembly is simple and easy to build.



The servos are installed on rails in the forward fuselage. Cirrus CS-4.4 servos are more than adequate to fly the Ultimate.

from the plans, and sand the leading edges to shape.

Build the interplane struts over the plans and then sand their leading and trailing edges round, but leave the top and bottom edges squared off for gluing.

FUSELAGE

The fuselage sides are built directly over the plans. Pin formers F1, F2 and F3 into place, and frame one side around them. For the opposite side, only F1 and F2 are used. Now is a good time to bend the 0.046-inch wire landing gear to shape, and assemble it into formers 7, 7A and 7B.

With both fuselage sides complete, pin them upside-down over the top/bottom view, and glue all the bottom formers and cross-pieces into place. When these have dried, remove the fuselage assembly from the board, and glue formers 1 through 6 into place. Next, add all the hard-balsa stringers to the top of the fuselage between formers 1 and 3, followed by F4 and F5 on both sides. Locate F4 and F5 carefully, as they set up the location of the cabane assembly later.

The aft turtle-deck stringers extend all the way to the tail post. Before you glue in the stringers, make a 3/32-inch balsa shim and tack-glue it to the top longeron behind F6. This will be used as a spacer to align the upper stabilizer supports. Once those have been glued into place, glue the centerline stringer into place, and allow it to extend just past the tail post. Next, fit the vertical balsa filler between the top stab support and the stringer, and glue it into place. Then add the rest of the stringers. Trim off the centerline stringer, and sand the aft end to shape. The stab shim can now be removed.

INSTALLING THE RC GEAR

Glue the servo rails into place, and space them to accommodate the servos used. I used Cirrus CS-4.4s, as they have more than adequate torque to control the model. The rudder servo is mounted on the centerline, and the elevator servo is mounted on the outside end of the rail. It doesn't matter which side the pushrod exits, but the servo needs to be on the same side as F3.

The elevator is controlled by a 0.025-inch wire pushrod running through a Sullivan no. 507 pushrod tube supported at both ends and in the middle. To avoid the added weight of the hardware, the pushrods are connected with a Z-bend at both ends. (Don't make the aft bend until final assembly.)

The rudder will be controlled by Kevlar pull-pull cables. Each cable is a single piece of string that runs from the rudder control horn through the servo arm and out the other side to the control horn. Tape the cables to the control horn, and mark the exact spot where the cables exit the fuselage on the plans.

There are a number of available possibilities for power systems. If you opt for the GWS 4:1 IPS drive, use the mount provided. The mount plate is placed to suit the drive and is glued into place between formers 1 and 2, set to about 1.5 degrees right thrust. Then the motor is glued to the mount with about 1.5 degrees of downthrust. Connect the receiver, and test the system. If all is well, go ahead and glue the bottom stringers into place. Otherwise, make the necessary corrections now while the motor is still accessible.

COVERING

Sand the entire airframe with 400-grit sandpaper to remove any bumps or boo-boos, and round off all the edges. Cover the airframe using your favorite method. I used Nelson Litefilm, but any lightweight covering material will work well. Don't use MonoKote film, as it is too heavy. Also, when you cover the wings, twist in a bit of washout while shrinking the cover.

FINAL ASSEMBLY

Build the cabane-strut assembly, and glue it into place. Work through the bottom wing-saddle area to apply glue to the joints at the top longeron and to F4 and F5. Align and glue the bottom wing into place. Position the top wing on the cabane, and glue it into place. Align and glue the interplane struts into place at the third rib in from the tips.

Glue the rudder and elevator hinges into place with a white glue such as Pacer Canopy 560. Align the horizontal stab and rudder with the wing and glue them into place. Add the tail-brace wires (use Kevlar fishing line). These wires are functional, so don't omit them.

Assemble and carve the wheel pants to shape, and then glue them into place. Secure the tailwheel with a dab of epoxy. Trim the wire axle flush with the outside of the pants and then seal the pants, the cabane struts and the nose block with several coats of water-based varnish; then paint them with Model Master acrylic.

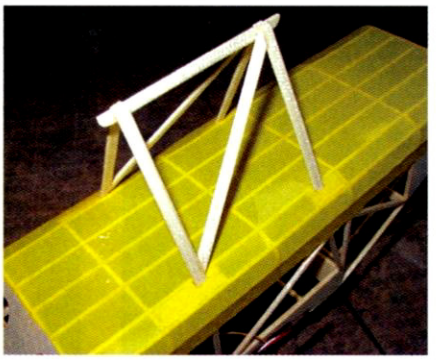
Run the rudder cables into the fuselage, and secure them to the toothpick control horn with a drop of CA. Position the rudder at neutral, and secure the cable under the

servo-arm screw. Place the elevator at neutral, slip the control horn into the slot, and make the Z-bend. Align the horn, and glue it into place on the elevator. Cut the canopy and windshield out of 0.005-inch acetate, and glue it into place. Build the battery hatch, and slip it into place on the bottom wing's center section.

Install the battery and receiver wherever they best accommodate the CG, and secure them with Velcro®.

FLYING THE ULTIMATE

The Mini Ultimate Biplane flies great, but it is an aerobatic airplane and is very spunky on the controls. The model is not "twitchy," but it's very quick to respond. The model can be hand-launched or flown off the ground. Using the GWS drive system and a 2-cell Li-poly battery, the model will do consecutive loops from level flight as well as stall turns, split-S's and some incredible snap rolls. It will also do "aileron rolls," but it needs a fair amount of up-elevator along with rudder to produce more of a barrel roll than an axial roll. The model will fly inverted, but because of the dihedral and airfoil, it requires considerable effort to keep it inverted.



The cabane strut assembly is installed in the fuselage after the top forward fuselage section has been covered.

Landings are really easy, as the model is very stable in slow flight and has no tendency to snap out from under you. Keep the nose down a bit, and carry a little power. Just before touchdown, ease the nose up and flare in for a smooth, 3-point landing.

The Mini Ultimate Biplane is a lot of fun, and it's small enough to fly in a schoolyard or even a soccer field. Try it; I guarantee that you'll love it! ✈

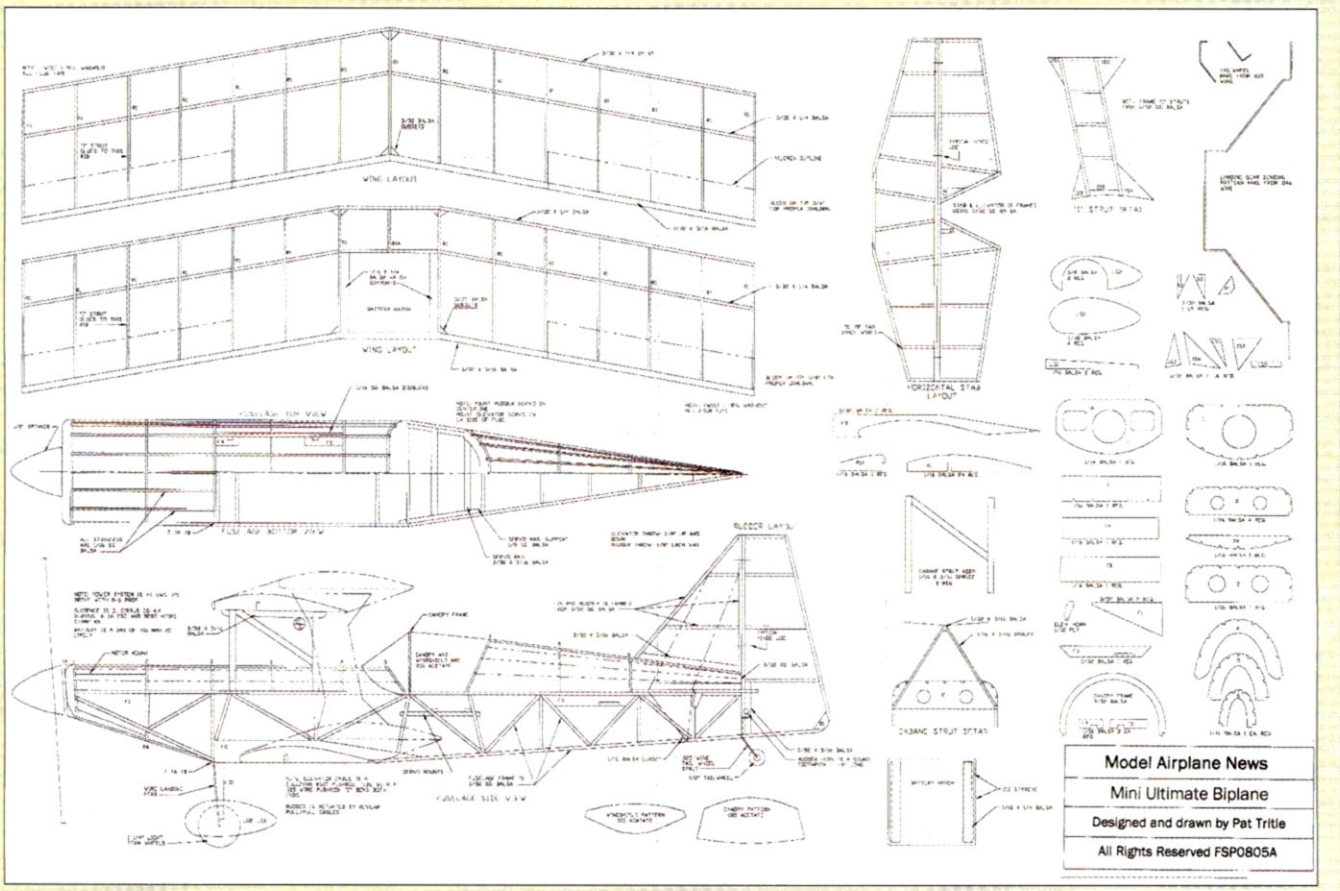
COMMENTS

Designed by Pat Tritle, the Mini Ultimate Biplane park flyer is fun to build and fly. It uses standard stick-and-tissue building techniques and can be powered by a variety of lightweight electric systems. A laser-cut "Short Kit" is available from Pat's Custom Models.

See the Source Guide on page 236 for manufacturers' contact information.

click trip MODELAIRPLANENEWS.COM FOR MORE PHOTOS & DETAILED INFO

FSP0805A MINI ULTIMATE BIPLANE



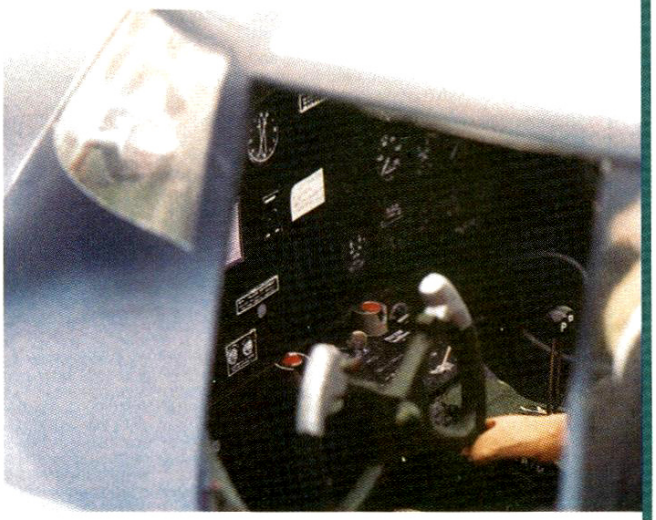
TO ORDER THE FULL-SIZE PLAN, VISIT RCSTORE.COM ONLINE.

The author's beautifully detailed B-25 on the flightline.

CREATE A DETAILED COCKPIT

BY CHARLEE SMITH > PHOTOS BY CHARLEE SMITH

AS A LIFELONG MODELER, I have long found the initial framing up of an aircraft's structure to be the most satisfying aspect of our hobby. Projects often come together quickly, but after the main structure has been built, progress often slows, and modelers become frustrated. While building my Wing Mfg. B-25 PBJ Mitchell, I discovered that an aspect of building I had never tried before brought me the same level of satisfaction as the initial gluing of balsa: the detailing of the cockpit.



A view through the cockpit's sliding window. The control yoke was made out of ⅛-inch aircraft plywood.

The pilot prepares for takeoff. The instrument panel was created using a photo of the full-size panel.

The area behind the cockpit is often omitted from scale models. A mirrored bulkhead creates the illusion of additional depth.

The opening for the pilot's window was cut out of the clear, molded canopy. Parallel sections of C-channel were then glued above and below the window to help it slide.

EARLY MODIFICATIONS

Because of the amount of detail that I wanted to put into the cockpit, I needed to modify the placement of several bulkheads from the positions shown on the Wing Mfg. plans. I eliminated the removable cockpit called for in the kit because I believed that I would have adequate—though not as convenient—access to the forward fuselage area through the nosewheel door and the removable top turret. The balsa cockpit floor was lowered ¼ inch to its scale location, which still left room for the retracted 3-inch nosewheel. Bulkhead F4A, on which the instrument panel is placed, was moved forward ¾ inch, and Bulkhead 175A was moved back ⅜ inch. Bulkhead F5 was moved back ¾ inch to leave enough room for the retracted Robart nose strut.

PLANNING THE INSTRUMENT PANEL

Creating the instrument panel was my next task. Every method that I've read about that would give me the desired effect seemed like a lot of work, so I wasn't really looking forward to this. Then I realized I had a picture of the full-size B-25H panel that I could reduce on a copy machine to just the size I needed. Actually, I needed two copies for my experimental method. I cut out a piece of 0.030-inch clear plastic to the shape of the panel and then glued one of the copies of the instrument panel to the back of it.

At a stationery store, I found sheets of ¼- and 5⁄16-inch self-adhesive dots that approximated the size of the instruments on the panel. On the front side of the plastic panel, I centered one dot over each instrument location and then sprayed the panel with flat black enamel. When the paint had dried, I carefully removed each dot with the tip of my no. 11 hobby knife. Voilà—instant instrument panel! To finish it off, I cut out from the second paper copy of the panel the various rectangular placards with their writing and then glued them to the front side. I added a few dots of silver and red paint with my riveting stylus, and I was finished.

PANEL COMPONENTS

Of course, photos of the full-size aircraft's cockpit from various angles are a necessity at this point. Then the fun really begins! Most components can be duplicated using miscellaneous items from your shop and home. Scrap balsa, aircraft plywood and maple are used for most of the major structures and electronic boxes.

I used a lot less of the thin plastic sheet than I thought I would. Plastic provides a nice, smooth surface for painting, but I found that I was perfectly happy with the results of just painting the wooden parts with silver, black, or green enamel, with no surface preparation other than sanding them smooth. This saved a lot of time. For various details,

The instrument panel faithfully reproduces that of the full-size B-25.

I cut round toothpicks and old, small paintbrush handles into ⅛-inch sections to serve as knobs and many other doodads. I used steel washers and aluminum rivets for items such as the trim wheels. Black and red round-head pins were pressed into duty as the throttle and other levers on the center console. I ground one side of the pinhead flat on a disc sander, then I used the very small rub-on lettering that is used in model railroading to finish them off.

> **"Most components can be duplicated using miscellaneous items from your shop and home."**

For the cables and wiring that connect the black boxes, I used black elastic cord from my wife's sewing supplies (I painted it silver when necessary). When I needed thinner "cables," I used flexible aluminum wire. To make the many on-off switches, I first put down dots of silver paint using the larger end of the riveting stylus. When the dots had dried, I stuck small straight pins into the center of each at a 40-degree up or down angle. Each pin was then cut off to an ⅛-inch length with wire cutters. The control wheel and column were cut out of ⅛-inch aircraft plywood, the edges rounded and sealed with thin CA and then painted. Using CA for the bonding of all these parts greatly speeds the entire process.

To duplicate the fixed gunsight reticle, I copied two appropriate symbols from Microsoft *Word* onto clear, self-adhesive film. I joined them back to back and then cut out the circles with a small base at the bottom, which I painted dark green. I then glued this to the top of the instrument glare shield.

BEHIND THE COCKPIT

One area that I rarely see detailed is the section behind the cockpit in bomber and transport aircraft. On Wing's B-25 kit, there is about 1½ inches of room to put radio sets, gun-shell racks and various other scale details. To give the illusion that this detail extends much farther into the fuselage, I made a false bulkhead out of ⅛-inch balsa sized to fit inside all the ¼-inch stringers that run along the inside of the fuselage. I covered this piece with MonoKote's self-adhesive chrome trim sheet, which created a mirror-like finish.

When the bulkhead is positioned against the installed detailing, it reflects images that make the details appear to extend well past the wing. This bulkhead is held in place mainly with T-pins and just a couple of drops of CA so that it can easily be removed for access to the cockpit area.

SLIDING-WINDOW CONSTRUCTION

Virtually every picture of full-size B-25s on the ground shows the pilot's sliding window open, so I knew from the start that I wanted to duplicate this detail, and it was easier to accomplish than I had anticipated. By using a fine razor saw, I was able to cut out the rectangular window from the clear molded canopy. I then glued parallel sections of small plastic strips of Plastruct "C-channel"—again, available from the railroad section of your hobby shop—to the inside of the canopy above and below the window, which slid perfectly between them. At this point, I discovered that there was no way to grab onto the window from the outside to close it all the way. I therefore drilled a very small hole in the front portion of the window's frame, and I now insert a straight pin to open and close it.

CANOPY

The full-size canopies have a framework that can be duplicated in models by gluing sections of T-shaped plastic (again, from the railroad aisle) to the inside of the clear molded canopy. For curved sections, the plastic can be preshaped by heating it with a heat gun and bending it to shape as it cools. For gluing to the clear plastic, I feel the gap-filling, odorless CAs are the only way to go; when these are combined with clear, plastic-compatible accelerator, they make this tedious job a fairly quick one. I have found that it is best to apply the CA to the clear plastic and then hold the T-sections in place. If the glue is on the small plastic sections, and your hand slips while placing them on the clear plastic, you will not be a happy camper. Care must also be taken to apply small amounts of accelerator so that it does not get onto the sections of clear plastic that you will be gluing next. I found that this framework is hard to see for the casual observer of the pilot's cockpit, but it really stands out in the tail-gunner's canopy.

Is all this extra effort worth it? Even though when everything was finished and the pilot was in place, I found that a lot of the detail could barely be seen, I had a lot of fun going overboard with it—and yes, I would do it all over again! ✈

See the Source Guide on page 236 for manufacturers' contact information.

A TOY SPACE SHUTTLE GROWS UP

GET INTO ORBIT WITH THIS $4 FLYER

BY MICHAEL BLOTT > PHOTOS BY MICHAEL BLOTT & DERON NEBLETT

ADMIT IT! Like me, you have seen this toy Space Shuttle from Guillow's in stores for years and have thought about converting it to RC. It took a dare from a friend—and the new, lightweight electronics and batteries—to spur me into action and make it happen.

The Space Shuttle is a durable, styrene-foam catapult glider. Its wing area is small, so don't expect it to be a floater. It is controllable in a baseball infield, though.

SHUTTLE CONSTRUCTION

Assemble the free-flight model, and try a few test glides to determine the center of gravity (CG). Mark the CG location, and balance the Shuttle to that CG after you have converted the model to RC. On my model, it was 7 inches behind the nose.

Foam-safe CA is used only for the control horns and the magnetic hold-downs (if you use them). First, sand the foam smooth and free of the mold flashing. Cut the "cargo bay" with a sharp hobby-knife blade that is at least 2 inches long. The rear cut should be ½ inch forward of the vertical fin, and the front cut should be 5¾ inches forward of the rear cut.

The horizontal cut for the bay is ¼ inch above the highest point of the wing. I used a ¼-inch piece of wood as a guide, keeping it parallel to the tabletop that the shuttle was sitting on. Mark a pencil-line guide for your cut, and use a sharp hobby knife that can cut through more than halfway. I used a long blade and cut all the way through to the marked guide on the other side of the bay.

Hollow out the cargo-bay lid to make room for the radio gear. Make small cuts with a sharp blade, and be careful not to cut too close to the exterior; an ⅛-inch wall thickness works well.

Specs

Model: Space Shuttle catapult glider w/elevon control
Manufacturer: Paul K. Guillow Inc.
Wingspan: 10 in.
Ready-to-fly weight: 3 oz.

Gear used

All parts (except shuttle) are available at sureflite.com.

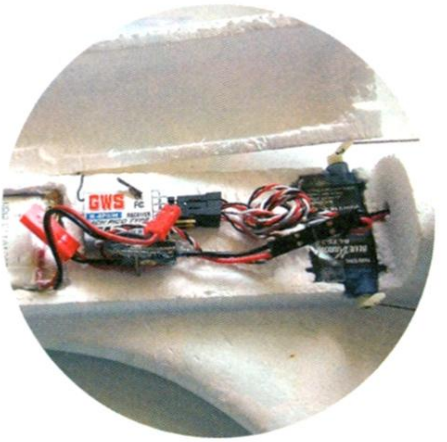
- Catapult launch (included)
- Decals (included)
- Two Blue Arrow 3.6g servos
- GWS Pico receiver with horizontal pins
- GWS 2A ESC (shorten its wires)
- GWS IPS motor (EDP-50X or 50XC)
- GWS 3x3 prop
- GWS prop adapter (optional)
- Pacific Models Micro antenna
- 2-cell, 340mAh Li-poly battery
- Crystal-clear tape for hinges and servo hold-down
- 8 small magnets for cargo-bay hold-down (optional)

Place the servos so that the output shaft extends to the exterior, and trace the servos' dimensions. Cut the shape down into the foam to the thickness of the servo; this helps lower the weight below the midline. Larger servos may need to be fitted vertically. Apply thin tape across the servos to hold them securely (you could also use foam-safe CA). If you can get your hands on the new-generation, higher-output Li-poly cells, which are lighter but can deliver the amps needed by the IPS motor, be sure to move the servos farther forward to help maintain the proper CG.

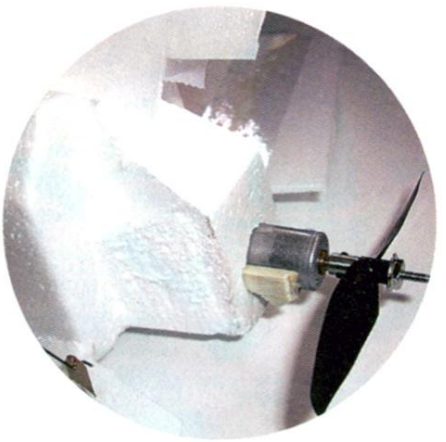
Cut a recessed battery area from the cargo bay into the nose; be careful not to cut too far forward. Cut the rocket motor's nozzles down to a 1-inch angle; cut only the sides and top. This allows the prop to access calmer air than if you leave them stock.

The IPS motor has a 12mm diameter, so use a 10 to 12mm tube to cut a hole in the rocket nozzle that's half the length of the IPS motor. As before, keep the hole parallel to the tabletop; you can shim the motor to change the thrust angle later, if desired. I used a little right thrust, but this might not be necessary for your model. The snug fit holds the motor in place, and the motor does not overheat with the 7.4V Li-poly pack. Use a stiff wire to drill a hole from the back of the motor hole to the cargo bay. Thread some string from the cargo bay to the motor hole to assist in pulling the motor wires through to the cargo bay.

Everything needed for the airframe (except the elevons) is provided in the kit.



Note the hollowed out "bay" area. The battery area is carved into the fuselage and forward into the nose.



The built-in motor mount needs some trimming to allow calmer air to get to the prop. For a snug fit, drill the motor hole the same diameter as the motor. Shims help align the thrust.

Cut the elevons out of foam food trays, and bevel the leading edges to allow free motion; then hinge them with thin, crystal-clear tape. The control horns are cut out of 1/64-inch ply (wood bonds well with the foam). Use 0.020-inch wire to connect the servo arms to the control horns. Half inch of control surface travel is all that's needed.

The cargo bay can be taped shut or secured with magnets. I pinned the radio gear down, as I was experimenting with different setups. A better, more stable method would be to use double-sided tape. To reduce clutter, I shortened the ESC's wire.

Originally, I routed the antenna out along the leading edge of the right wing. The antenna should be kept short to avoid its becoming tangled with the prop. A base-loaded micro-antenna is another way to do it, and this method adds a cool look.

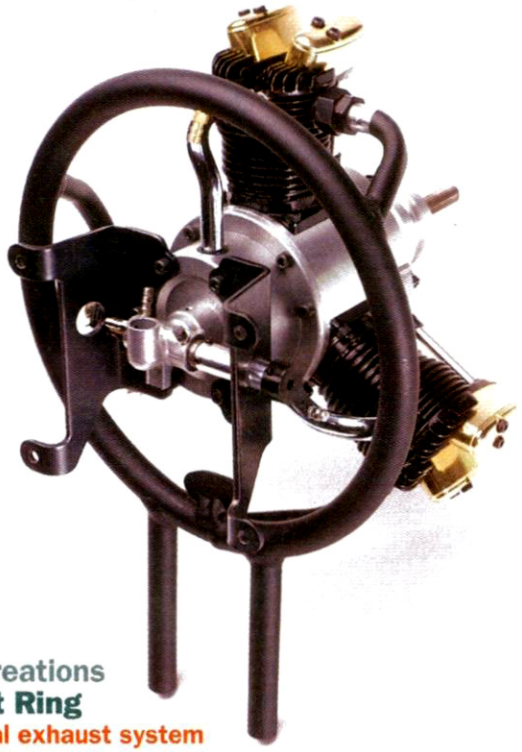
The Space Shuttle comes with a nice set of decals. Foam-safe paint or a marking pen may be used to decorate the wing's leading edges. This is a lighter method that eliminates the possibility of your decals lifting off when they're placed over compound surfaces.

FLYING

As is common with many flying wings and deltas, launching can be a problem. The easiest method is to add a small skeg at the CG on the bottom of the shuttle. This gives a convenient surface to grip during launches as well as a little protection on landings. Alternatively, you can grasp the left wing in your right hand and give a sideways underhand toss; the large fin quickly straightens the flight.

The Space Shuttle is more stable than it looks. With the low aspect ratio wing, its roll rate is predictably fast, and it stalls quickly if too much up-control is used. The trick to sustained flight is to keep the airspeed up. Flying the Space Shuttle is a kick, but the look of awe from your field mates is even more enjoyable. +

See the Source Guide on page 236 for manufacturers' contact information.



Keleo Creations
Exhaust Ring
Easy radial exhaust system

Everyone loves radial engines; they look and sound great. But the one thing that modelers don't like about radials is the routing of their separate exhaust pipes. A single flex pipe is usually needed for each cylinder, and the more cylinders the engine has, the worse the problem.

Keleo Creations has the answer you've been looking for: an exhaust collector ring. With the Keleo exhaust ring, the need for flex pipes—and all the headaches associated with them—is gone forever. Made of aluminum that has been powder-coated for durability, the exhaust rings are very strong and light. The ring that I reviewed was for a Saito FA-170R3D (3-cylinder).

Each header on the ring is flanged to seat in the exhaust port of the engine, and attachment nuts are installed on the headers. Installing the ring is uncomplicated but does require a little patience. As you first install the ring, you'll find that the last header probably won't line up exactly with its exhaust port. This is OK, as the instructions say that the ring does not fit until the header pipes are all the way into the ports and fully tightened.

I found that working one header into an exhaust port and just starting one of the attachment nuts is the way to go. I could then fit the next header and start the attachment nut. When all of the headers have been fitted, one at a time, slowly tighten the attachment nuts. Don't fully seat a single header, as you'll pull the other headers out of alignment. Nor should you overtighten the nuts, as you can distort the flanges and make it very difficult to remove the exhaust ring later.

To test the exhaust ring, I mounted the engine on my Kondor Model Products Sea Fury. It surely did look great! I've flown the engine in another model, so I knew what to expect from it. Much to my surprise, there was virtually no change when compared with the flex pipes that I had used before. The engine's rpm were right where they should be, and the idle was unaffected. The engine still had that cool radial sound.

The Keleo Creations Exhaust Ring is a product that many modelers have been waiting for. It's fairly easy to install and really cleans up a radial engine's installation; the only tool you need is a wrench. Keleo Creations offers many styles of exhaust rings for all the popular radial engines. If you need a custom ring, contact Keleo; the folks there will be more than happy to make exactly what you need. The exhaust ring for the Saito costs $95, and that's quite a bargain for what it does.
—Rick Bell

Keleo Creations (503) 359-5318; keleo-creations.com.

RCATS
Smart Lithium Glow Driver
Light 'em up

How many times have you searched frantically through your flight box for a charged glow driver after your main one has died? It happened to me a few times, and the sad part is that I hadn't charged the main driver, so why did I think I had charged my backups? Needless to say, I hadn't; they were as dead as my main glow driver. I had to rely on the kindness of my fellow fliers to provide me with a charged glow driver to get my plane back in the air.

This new RCATS lithium-powered glow driver is perfect for a guy like me; it's powered by two lithium-ion cells to achieve 4400mAh of capacity. This means that the charge on the RCATS glow driver will last about a year with normal use before it needs to be recharged! I can do that! Now I charge my glow driver every time I replace the batteries in my home smoke detectors—every spring and fall (an easy way for me to remember). Now, *I'm* the guy at the field who offers his glow driver to the fliers whose drivers are dead.

The RCATS Smart Lithium glow driver measures roughly 2¾x5 inches and fits in my palm. The 30-inch core ends with a Du-Bro standard glow-plug clip that easily attaches to almost any engine's glow-plug setup. The translucent blue case houses all of the electronics and protects everything from fuels, oils and dirt. It has a built-in Li-ion charger with safety circuitry to prevent over- and under-charging. Simply plug in the included wall adapter, and the glow driver will be fully charged in 8 hours or less, depending on the condition of the battery. An LED light goes out when charging is complete.

To use the Smart Lithium glow driver, I first attach the glow-plug clip to the glow plug and press on the case area just above the "on" symbol. An LED lights up to show that the driver is on. From one to 10 LED lights simultaneously come on at the top of the unit to indicate the power level that the glow plug is using. Each light represents approximately 0.5 amp. The number of lights depends on the amps your glow plug needs up to a maximum of 5. I found that most of my plugs required only 2 or 3 amps. After about 60 seconds, the auto shut-off kicks in, and the unit turns off. This is an excellent safety feature, but it can become bothersome, especially if you're having problems starting your engine because you have to keep turning the glow driver on. A simple press of your thumb is all that's required to restore power to the glow plug, however.

The RCATS Smart Lithium glow driver could easily be the last glow driver you will ever need. Because of its long battery life, you will never have to worry about the starting power to the glow plug. Price: $110. *—John Reid*

RCATS (408) 292-9794; rcatsystems.com.

RJRCoolTools.com
Phillips screwdriver set
The right tool for the job

Many years ago, my grandfather—a mechanic for 55 years—told me that with the right tools, you can fix anything. I have found this almost always to be true, especially in modeling. One tool that you might never have thought much about is the Phillips screwdriver. This handy tool is used in so many model airplane assemblies that it is possibly the most-used item in your toolbox.

But believe it or not, there are different standards for Phillips screwdrivers. Most screwdrivers manufactured in the U.S. conform to the American National Standards Institute (ANSI) system that's used in North America. The Phillips-head screws that are used in many RC airplane kits and radio systems, however, are manufactured to Japanese Industrial Standards (JIS).

The JIS hardware differs just slightly from the ANSI-formulated Phillips standard driver. One difference is the thickness of the slots found in the JIS screws; they don't allow the ANSI Phillips driver to seat all the way down to the bottom of the slot. If you try to tighten this loose-fitting connection, you will most likely strip out the soft Phillips screw.

To help solve this problem, RJRCoolTools.com now carries a complete line of screwdrivers manufactured by Moody Tools to the Japanese industrial standards. Moody Tools created the innovative Polliccis line of anti-static tools that have ergonomic handles with swivel tops that are contoured to fit perfectly in your hand. The first time you try these Phillips screwdrivers, you'll immediately see—and feel—the nice fit of the handles in your hand. The fit into the screw is so good that you can place the screw on the end of the screwdriver, and it will stay there as if magnetized!

This four-piece set includes size nos. 000, 00, 0 and 1. Each screwdriver has a blade length of 2.5 inches with an overall length of 6.2 inches. This four-driver set will cover a wide variety of fasteners; for example, the no. 1 Phillips fits screws found on O.S. engines. The no. 0 Phillips fits the screws found on Futaba S3000-type servos. The nos. 00 and 000 fit a wide variety of micro aircraft screws, including those used in Hitec's HS-55 servos.

Once I started working with these screwdrivers, I found that they are the only ones I reach for whenever I have a Phillips screw to remove. Price: $16 (includes S&H). *—John Reid*

RJRCoolTools.com (877) 230-2085.

AstroFlight
Super Whattmeter Model 101
A "must-have" tool for electric flight

Electric-power enthusiasts (and modelers in general) have used the popular AstroFlight Whattmeter for more than 15 years. This small unit is capable of measuring electric motor current, voltage and power (watts!) for models from backyard flyers to ¼ scale! The meter also lets you determine battery capacity in ampere/hours (Ah). As a bonus, you can insert it into the battery cable of your RC system, where it can help to find and correct control linkages that bind and waste precious battery energy.

Unlike its predecessors, the new Model 101 will work below 4 volts if you plug in a standard RC system 4-cell Ni-Cd or NiMH battery pack. Another bonus of the new unit is improved resolution of up to 10 milliamps!

The unit can read a maximum discharge-current level of 70 amperes (amps) and determine motor input power of up to 4200 watts. Voltages can be read (with an auxiliary 4-cell battery) from 0 to 60 volts. You can access the instruction manual at astroflight.com. These instructions also include diagrams for hooking up the meter to read electric-motor parameters and to test battery discharge.

Embossing on the meter case indicates that the right-side cable is "source," and the left cable is "load." When you connect the meter, always plug the battery into the source cable first and allow the LCD screen to light up; then plug the motor into the load cable. Failure to follow that startup procedure will result in erroneous readings.

This is certainly a must-have product for any modeler. Never guess on your motor or battery current, voltage, or power; always measure these parameters with a meter. The Model 101 is available with AstroFlight Zero Loss connectors for $59.95; with Deans Ultra-type connectors (Model 101D) for $59.95; and without any connectors (Model 101N) for $54.95. *—Bob Aberle*

AstroFlight (310) 821-6242; astroflight.com.

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BY PALMER JOHNSON ▸ PHOTOS BY PALMER JOHNSON

The de Havilland comes in for a nice, 3-point landing at the Florida Jets event.

SPECIFICATIONS
Model: de Havilland Venom Mk. 1
Wingspan: 84 in.
Length: 84 in.
Weight: 24 lb.
Engine: Jet Cat 120 turbine

The de Havilland Venom!

A TWIN-TAIL WONDER WOWS 'EM IN FLORIDA

The cockpit is fully detailed and includes a nicely detailed scale pilot figure complete with oxygen mask! The canopy also slides open and closed.

The model is molded of fiberglass and resin. The rivet and screw-head details shown here are incorporated into the molds Erich made himself.

The detailing goes all the way down to the tiny stenciling shown here.

More than 162 pilots from around the world arrived to fly 900-plus sorties at this year's annual Florida Jets event. One of these pilots, Erich Himmler of Zurich, Switzerland, showed off his very impressive de Havilland 112 Venom Mark 1. This seldom-modeled jet put in several flights over the weekend.

The full-size Venom was designed as a natural successor to the Vampire, and although it looked similar, the Venom had a thinner, straighter trailing edge and was equipped with wingtip tanks. The prototype first flew on September 2, 1949. Its operating speed was around 590mph. Designated the FB.1, the first Venom variant, a single-seat fighter-bomber, entered service in 1952; 373 of them were built. It was armed with four Hispano 20mm cannon in the nose and could be armed with either two, 1,000-pound bombs or eight rocket projectiles, and it became one of the first ground-attack jet aircraft in the world. The Venom was powered by a single 4,850-pound-thrust de Havilland Ghost 103 turbojet engine.

On December 29, 1953, the final Venom variant built for the RAF—the single-seat FB.4—took to the skies for the first time. It entered service in 1955; 150 were eventually built.

Erich designed his 84-inch-span Venom himself and made more than 40 molds to create the fiberglass model. The finished plane has more than 1,200 rivets, plus screw heads, hatches and panel lines that are all incorporated into his molds. He also designed the landing gear himself. The plane's fine detailing and weathering are inspiring; Erich even simulated the arc welding of the wingtip tanks to the wing! The Venom has a nicely detailed cockpit, a scale pilot figure and a sliding canopy. If you look very closely, you can see that Erich even duplicated the minute nomenclature stenciling for various hatches and control surfaces.

We think you'll agree that the Venom is an antidote for garden-variety models! ✈

Even the welding marks on the full-size wingtip and the fuel tanks are faithfully reproduced!